The Iron Age

A Review of the Hardware and Metal Trades.

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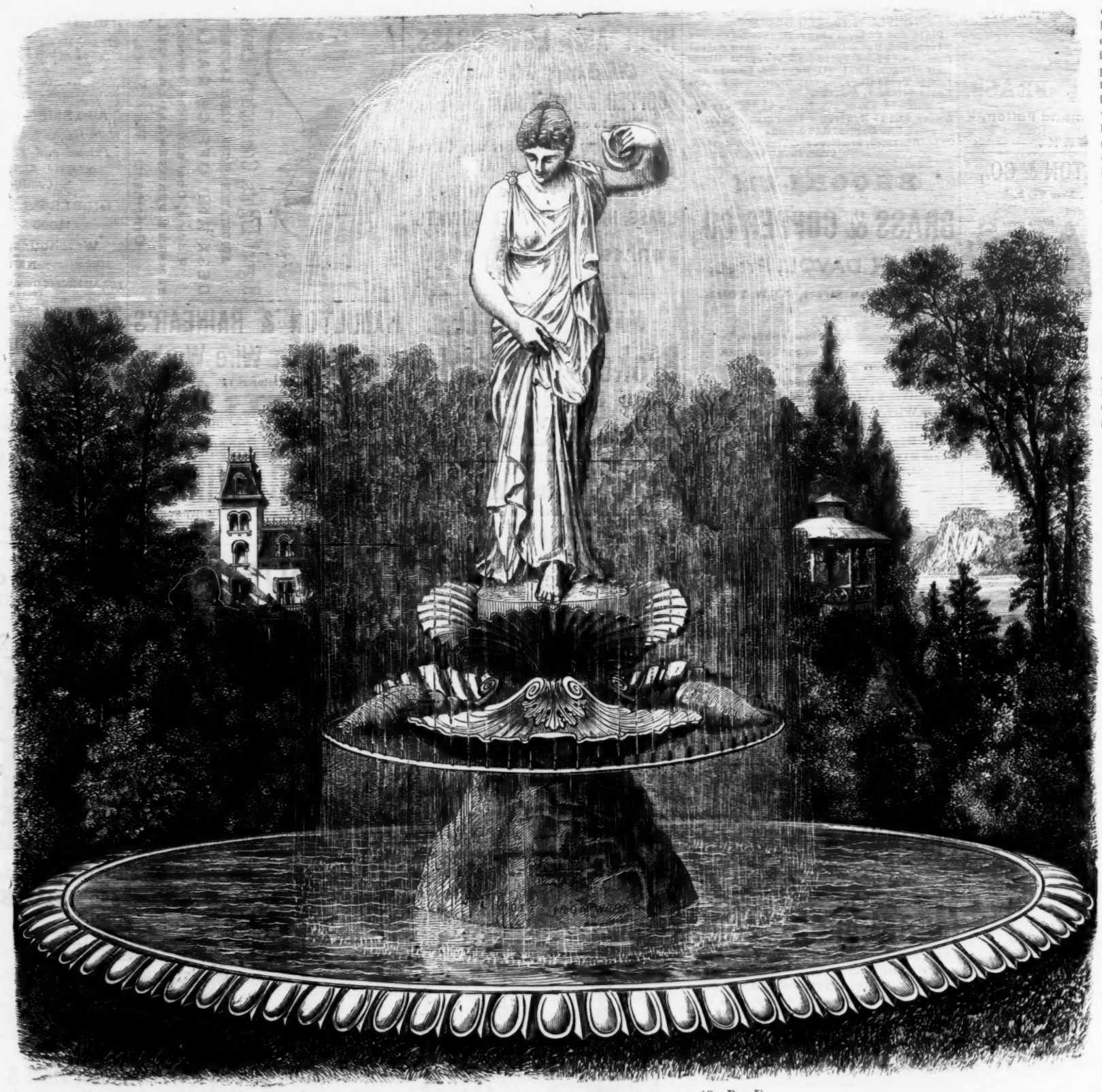
An Improved Process of Casting Metals.

Recent experiments in England with the process of casting metals under continuous and considerable pressure—an American invention, as many of our readers will remember—have been so successful in producing perfect and clean castings as to win for this method hearty commendation from the British press. The processes may be briefly described as follows: The article to be reproduced is a finely cut medallion, with, say, a plain reverse. It is in the first place laid face upward upon a thick smooth metal plate, fitted with certain stops to keep the medallion in position. The latter is then coated over with a creamy mixture of kaoline, or china clay, and fine sand flour, mixed with oil, the whole resembling in consistency very thick paint. This is laid on with a soft brush. The plate and medallion are then placed in the bottom of a flask of great strength, made of iron or gun metal. The very finest description of molding sand is sprinkled over the medallion, first by hand, and then the flask is filled up about water measure with the same. This being done, and the sand being well tamped around the sides with a wooden dolly, the flask is pushed beneath a frame, in appearance not unlike a huge letter copying press. The screw of this press is turned by two men moving a long iron cross handle, and a plate precisely fitting the interior of the flask is forced down on the sand, after the manner of making bricks by the semi-plastic process. The flask is then withdrawn and the sides opened, then the plate and the sand removed, and reversed upon a surface table, and the plate lifted off. The medallion is gently heated by a gas blow-pipe; this expands it slightly, still further forcing its impression into the sand; then on cooling down it contracts, becomes loose, and is easily lifted out. The fine clay slip makes a beautiful smooth glossy surface lining to the mold. The mold is further hardened by baking, and at the time it is ready to receive the metal it forms a most faithful impression of the object to be reproduced. Any description of mold can, of course, be made, either single or in halves, and with or without core, as required. More than a single casting also may be comprised within one mold block, a separate "gate" being provided for each. The mold has one large orifice going quite through it from side to side, the side gate to the matrix opening from it.

A number of these molds being complete, they are ranged in order within a proper casting case and compressed by a screw; the holes of all the molds correspond and form a pipe or tube terminating at the point where the metal is to enter. The orifice in the casting case is fitted with a circular clay collared nozzle, which nozzle is fitted with a clay plug which fits it tightly. A horizontal iron cylinder communicates with this nozzle, and within the cylinder works a piston and rod, the rod passing out of the end of the cylinder most remote from the molds. In the upper side of the end of the cylinder farthest from the molds is a hole, surmounted by a hopper. As the molten metal would at once chill solid as a ring, where it encountered the cold metal of the cylinder, the latter is coated inside with a "fettling" of some refractory substance, which is applied with a brush while in a semi-fluid state.

The *modus operandi* of casting is thus described: The piston being drawn back, the molten metal is poured into the cylinder; the piston is then urged forward, by means of power applied behind, to the piston rod. As the piston—which is simply a solid disc fitting the cylinder itself precisely—advances, it scrapes off the lining of the latter, and this lining curling inward effectually packs the piston and prevents the escape of the metal by leakage. For a time the clay plug in the nozzle resists the pressure of the iron urged on by the piston; it, however, is at last forced in, and the metal impelled on by the piston, is forced into the minutest cranny of the molds. A great and advantageous feature of the process is the total exclusion of the air during the passage of the iron into the molds. This, from the accuracy in making the molds by the aid of machinery, and the subsequent forcing of the metal into them while the metal is fluid, gives as a result castings perfectly homogeneous and free from air blows; and the design of the matrix is reproduced on the metal so perfectly that no subsequent tool chasing is requisite, because the original itself, perhaps a perfect example of the chaser's art, is reproduced in perfect *facsimile*. One great merit in the application of Mr. Smith's process of casting to the thousand-and-one industries of Birmingham is that it involves no operations of a complex or difficult character. The work is of a nature so simple, and as a rule so light, that women, boys and girls can perform it quite as well as men, and at the same time it supplies a means of reproducing in infinite numbers all the gems of carving, modelling and chasing that are in existence, thus largely contributing to the promotion of a more beautiful taste throughout the world by bringing objects of real beauty within the reach of the most humble household. There is practically no limit as to the nature of the metal, for any metal, from cast iron to gold, may by employed.



APPLICATION OF METALS TO ART—A ZINC AND IRON FOUNTAIN.—(*See Page* 5).

Artificial Eye Manufacture in Birmingham.

A French paper gives a detailed account of the manufacture of false eyes in Paris, from which the curious fact appears that the average sale per week of eyes intended for the human head amounts to four hundred. One of the leading dealers in this article carries on the business in a saloon of great magnificence. His servant has but one eye, and this peculiarity is turned to good account, for the effect of any of the eyes wanted by customers is conveniently tried in the unfortunate servitor's head. The charge is stated to be about $10 per eye. For the poor, there are second-hand optics which have been worn for a time and exchanged for new ones. They are sold at reduced prices, and quantities are sent off to India and the Sandwich Islands. The manufacture has been successfully introduced into Great Britain, and now forms one of the curiosities of Birmingham industry. One of the papers of that town not long since gave an amusing account of a visit to the factory devoted to the fabrication of false eyes, and from this account we extract some particulars that may prove interesting. It appears that the Birmingham maker of these curious wares, Mr. Pache, at one time limited his operations to turning out dolls' eyes, and was only prompted to attempt greater achievements by a visit to the Exhibition of 1851. Here he saw some "human" eyes of French manufacture, which he carefully examined, and applied his ingenuity to discover the well-kept secret of the process of production.

After experimenting for several years, he was enabled not only to imitate but to surpass the productions of the French makers, and eyes of his manufacture are now sought for by those who are so unfortunate as to require them, from all parts of England, Ireland, and Scotland, as well as from various foreign countries. Mr. Pache, like his French rivals, keeps the process of manufacture a profound secret, and would on no account permit any stranger to enter the workroom where this branch of the trade is carried on. Even the workpeople are sworn to secrecy by an oath sacred and inviolate. A collection of glass eyes may be seen in the establishment of all shades and colors—bright, beaming, bloodshot, languishing, dull, vacant—to suit man and womankind or every degree. The smallest so made are known as "humming bird" eyes. They are about the size of a pin's head, and are made of all colors. No one seems to know what the natural color is, or, if they know, they do not care, for orders come for hundreds of gross at a time, endorsed "color no object." Many of these large orders are from the United States. Finch, partridge, and pheasant eyes are also made in amazing quantities, and the demand is very large for the eyes of the blue creeper (an African bird) and the scarlet tanniger. All the birds' eyes enumerated are used in the decoration of ladies' head gear, the humming bird, with its ruby head and topaz breast, being an especially favorite ornament. Eyes for foxes, stags, rocking-horses, wax figures, prize oxen, horses, sheep, and dolls are also made in very considerable quantities. The head of foxes and stags which, with other trophies of the chase, adorn the halls of country squires, require eyes of best workmanship; eyes for other members of the brute creation are largely ordered by the disciples of Frank Buckland; while the claims of the nursery maintain a uniformly steady trade in eye for rocking horses and dolls. The paper we have before referred to, describes, in the following sketchy style, the process of manufacture: "We descend into a chamber, into which no ray of daylight ever enters. Dank and dark, it is in fact a cellar. Down one side however—instead of beer barrels—is a wooden bench, on which are a number of foot-blasts, to which are attached gas jets. Some half-dozen youths are manipulating rods of glass of various colors in a most ingenious manner. Heating the end of one of the glass rods by means of the blow pipe, the workman "gathers" from it sufficient for his purpose on the end of a wire. This first gathering is generally of a white or colorless glass to form the white of the eye. He then takes the rod required to form the iris, and "gathers" from it on to the end of the white; and lastly, a little spot from the black rod is added to form the pupil. During the process a "gathering" on the end of the wire is rotated in the flame of the blow-pipe, and occasionally pressed against a smooth surface to obtain perfect evenness of outline. The white glass referred to as forming the white of the eye is, more strictly speaking, a composition of the nature of cement, in which arsenic predominates. Orange-colored glass is used in the manufacture of certain kinds of eyes, and it is somewhat singular that this color can only be obtained in the shape of beads of French and German manufacture, which are bought and melted down in large quantities. Eyes of medium size are made by an experienced workman at the rate of a gross per day. Small birds' eyes are made much more rapidly. The selling price of eyes ranges from 6d. per gross to 3/ per pair, the former being for humming birds, and the latter for bullocks and horses.

Mention is made, in the technical journals, of some valuable researches recently made by Mr. Galloway, an English chemist, on the conditions under which safety lamps, as they are termed, are truly safe. It has already been ascertained that if a Davy lamp be burning tranquilly in an explosive atmosphere, the transmission of a sound wave, produced by slight explosion of gunpowder, is sufficient to determine the communication of flame from the lamp to the surrounding atmosphere. Hitherto it has generally been assumed that the occurrence of a colliery explosion, after firing a shot is due to actual communication of flame from the gunpowder to the fire-damp; but these experiments show it to be much more likely that the explosion is determined by the noise of the shot being promulgated through the galleries of the mine to the lamp.

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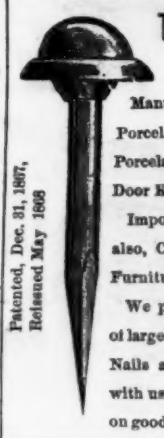

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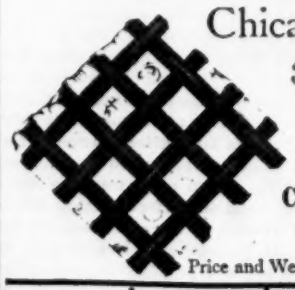

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11	2.75	32	12	2.45	31	13	2.15	30	15	1.97	30	17	1.47	25	19	1.08	25
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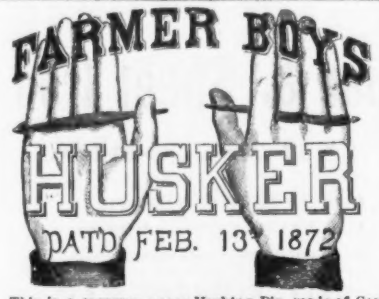

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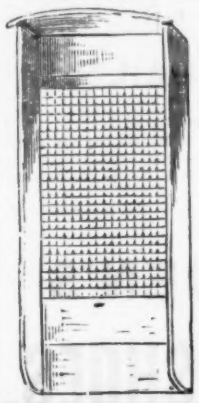

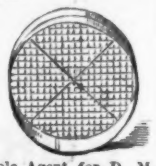

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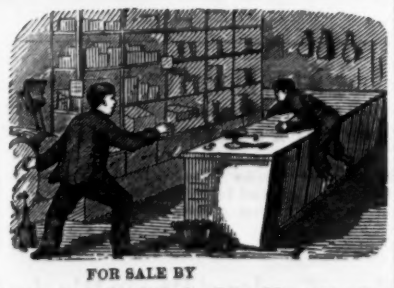

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Early Elastic Railway Wheels.

BY JAMES A. WHITNEY, M. E.

Our best railway passenger cars are fitted with, among other comparatively recent improvements, elastic wheels, this property being given them by a packing of paper compressed between the nave and the rim. That the degree of elasticity must be slight may be inferred from the fact that the pressure per square inch (applied in the preparation of the materal for ore), applied by hydraulic power, is sufficient to bring the packing to the hardness and density of wood, for which, indeed, it may be considered a substitute, as a wood filling, arranged in a similar manner for like purposes, was among the earlier projects for improvement in railway rolling stock. It is not impossible, moreover, that an approach more or less close to the original type might be made with advantage, for it is difficult to conceive how cottonwood or pine, or other soft-fibred wood, would differ, if condensed by pressure, from the cellulose of paper identically treated. But it is hardly the function of this present article to comment upon mechanical adaptations likely to be tested sooner or later by careful practice, but rather to mention the successive steps by which projectors have sought to obviate the jarring of vehicles, independent of the alleviating effect of springs interposed between the axles and the framing, or bodies. I have previously had occasion to remark upon the prolific genius of English inventors, especially in matters relating to railways, and it is in the patent records of Great Britain that we find at once the most ridiculous and the most feasible of projects; the two classes of alleged improvements not infrequently issuing at different times from the same brain. Of the class first indicated is the earliest elastic car-wheel, of which I find any record The invention was designed more particularly for "carriages" (cars) used for passenger and light freight traffic, and was constructed "with spokes composed partly of cylindrical tubes containing helical springs, these being so combined with rods as to form spokes capable of yielding in case of a shock or concussion happening to the carriage, and such wheels being, for further security and steadiness, furnished with double sets of such spokes connected to the rim by loops or joints which are common to both sets." This brief description sufficiently illustrates both the character and futility of the device, in which last named particular it is scarcely exceeded by any of the thirty-eight elastic car-wheels patented in England previous to the year 1871. But another, devised by an engineer no less distinguished than William Bridges Adams (the inventor of the fish-joint for railway tracks, which has saved millions of dollars annually to the railway interests of the world), approaches very nearly the early instance just given. Adams employed, "instead of spokes, four or more elastic hoop springs of a circular or nearly circular form, within the circular rim of the wheel and around the central nave thereof, each such hoop spring being firmly fastened to both the rim and the nave, and forming the only connection between them, and so arranged that they will act in correct concert to restrain the weight which is to be carried by the wheel, but by their yielding will ease the jar and concussion which the rim of the wheel is subjected to in traveling." This interposition of an elastic medium between the hub and the tire is, it must be observed, a totally different thing from elastic tires or yielding surfaces applied externally to the rigid tire, or peripherical portions of the wheel—the former simply prevents, or is designed to prevent, the evil effects of jarring; the latter to provide a greater bearing surface, and, consequently, greater tractive hold upon the ground.

The first wood-packed railroad wheel mentioned in the English patent records is that of Pierre Barthelemy Grunibert De Bac, dated May 13, 1837. This inventor provided (as nearly as can be inferred from the somewhat obscure description in the Abridgements before me) a metallic shell on the axle, into which was jammed a wooden cylinder, the spokes being socketed in the shell with an intermediate packing of felt. This imperfect idea simply foreshadowed the complete device brought out three years later by Joseph Beattie, which, however complex in its construction, embodied the features found essential in the simpler inventions of more recent days. He described his wheel as comprising "pieces of oak or other suitable wood of segmental form, but furnished with shoulders, and placed with the smaller ends toward the center of the wheels, the nave or center of which is of cast iron, furnished with mortises to receive them. The fiber of these pieces is in line with the radii of the wheel. Such pieces being secured together by dovetailed and other pieces, having the fiber across the plane of the wheel, which being thus far formed is turned up and an inner tire shrunk thereon, this tire having a small flange on each side of the interior to secure the wood, and a flange of the ordinary character on the outside" for holding the external tire of steel. This patent also described certain machinery for compressing the wood, the inventor evidently desiring to elaborate his plan in all its details. In 1842, John Henry Pape embodied in a specification a method of arranging bent wooden felloes within the metallic rim or tire of the wheel. The first mention of the application of India rubber to the purposes under consideration is in a British patent in 1850, on a communication from abroad, and set forth as "intended materially to arrest all shocks received by the wheel at the circumference before they reach the axle, such effect being obtained by interposing between the nave and the rim some permanently elastic substance, as India rubber or compound of like character." This use of caoutchouc was reiterated in Melville's patent of the same year, this projector, moreover, designing to use as a substitute compressed wool, cocoa-nut husk, or cork, as the case might be. In 1856, W. Bridges Adams abandoned his previous project of interposing metallic springs between the nave and the circumferential portions of the wheel, and duplicated, in his application for a patent, the use of India rubber and the like, as set forth by others in previous cases; but he described several new ways, possessing more or less novelty, of fixing the material in place.

The Transverse Strength of Solid Cylinders of Wrought Iron.

BY J. LEE MARSH.

Having occasion, in designing a railway bridge, to determine a coefficient for the safe center load of horizontal solid cylinders of wrought iron, I consulted Mr. John C. Trautwine's "Civil Engineer's Pocket Book."

The coefficient for the quiescent breaking loads of rectangular beams of wrought iron, supported horizontally at both ends, and loaded at the center, is given by Mr. Trautwine as 2400 lbs. average; the elasticity, he adds, is injured at about 4 10 of the above load. The strength of a cylindrical bar, with diameter equal to the side of a square bar, is given as ·589 of the latter.

With these figures I found that my safe center load for a cylindrical bar 2 in. in diameter and 2 ft. between supports, was but 3840 lbs. Thinking this result not quite satisfactory, I proceeded to test the behavior of cylindrical bars under the above named conditions.

In my experiments the stress was weighed upon a Fairbanks platform scale, the load used being pig iron applied at the end of a lever. In applying and removing the load, considerable vibration was produced; probably not less than the bar would be subjected to in a railway bridge.

The result of my experiments, given below, may be of interest to others engaged in pursuits similar to my own.

FIRST EXPERIMENT.

Elmira Rolling Mill Company's merchant bar (rough, but straightened by planing slightly on the bottom side), 1⅝ in. diameter and 2 ft. between supports, loaded at the center with load of

500 lbs. deflected	·03	inches.
1000 " "	·06	"
1500 " "	·09	"

On removing the load, no set was found to have taken place; 2000 lbs. was then applied and left on the bar for the space of an hour, the bar deflecting ·125 in. On removing the load the bar retained a set of ·005 in.; 2500 lbs. were then applied, with a deflection of ·5 in. and a set of ·37 in.

SECOND EXPERIMENT.

Elmira Rolling Mill Company's merchant bar (treated as above), 2 in. diameter, 2 ft. between supports, and loaded at the center with load of

500 lbs. deflected	·01	inches.
1000 " "	·02	"
1500 " "	·03	"
2000 " "	·04	"
2500 " "	·05	"
3000 " "	·06	"
3500 " "	·07	"
4000 " "	·08	"
4500 " "	·09	"
5000 " "	·1	"

At this point the load was removed, but no set was visible. A load of 5500 lbs. was then applied, the deflection being ·11 in., but with 6000 lbs. the deflection increased to ·125 in., showing the elastic limit to have been passed. On removing the load the set was found to be ·0075 in. The bar was again loaded with 6500 lbs., deflecting ·16 in., and with 7000 lbs. the deflection reached ·23 in., leaving a set of ·11 in.

I assume that in these experiments the loads representing the elastic limits of the bars tested are for the first, 1750 lbs., and for the second, 5500 lbs.

Then in the formula,

$$\text{load,} = \frac{\text{area} \times \text{depth} \times \text{coefficient,}}{\text{length between supports}}$$

the coefficient of strength, within the limits of elasticity, for solid cylindrical bars of wrought iron supported horizontally at both ends and loaded at the center, is 1760 nearly.—*Van Nostrand's Magazine.*

Iron in India.

Iron producing minerals are widely scattered over India. There are magnetic and specular iron ores and red hematite in beds and veins; there are clay iron ores from the coal-bearing strata; and there are surface deposits derived from the waste of metamorphic and sedimentary strata, and from laterite. The latter formation contains from 20 to 30 per cent. of iron. Some of the most remarkable deposits of magnetic iron ores are in the Salem district of the Madras Presidency. The ores occur in immense beds, 50 to 100 feet thick, and the outcrop may be traced for miles. On one hill, six miles from Salem, there are five bands of magnetic iron from 20 ft. to 50 ft. thick. At Lohara, in the Chanda district of the Central Provinces, there is a hill two miles long and half a mile broad, the surface of which is covered with masses of almost pure iron ore. In Bandalkhand and in the Narbada Valley there are large quantities of hematite ores; the supply in many cases is practically inexhaustible. The clay iron ores in the Raniganj and other Demuda coal fields yield 39 per cent. of iron. The Kamaun iron ores form an argillaceous band, containing large quantities of red hematite, the ore bed being 10 ft. to 20 ft. thick, and extending for a long distance. The surface deposits supply the greater proportion of ores used by native smelters, but much labor is necessary in the collection. Iron has been manufactured in India from time immemorial, and iron weapons are found in the ancient cromlechs and kistvaens, but there never were any large works. The production of iron is the work of poor people of very low caste, scattered over the country. They have small clay furnaces, with charcoal for fuel, and the blast caused by foot or hand bellows. The smelting goes on for eight or ten hours, at the end of which time from 10 lb. to 20 lb. weight of iron is found at the bottom of the furnace This is purified by reheating and hammering, and the resulting iron is generally of excellent quality; but the native manufacture is rapidly decreasing owing to the difficulty of obtaining charcoal. All attempts by the English to manufacture iron in India have hitherto utterly failed. In 1825 Mr. Heath, of the Madras Civil Service, obtained a government advance, and formed a company to establish ironworks at Porto Novo, near Cuddalor; at Porumputi, near Salem; and at Bepur, where the iron was obtained from laterite, but the result was nothing but failure, attributed partly to the distance of the works from the source of supply and to the scarcity of charcoal. In 1857 Mr. Sowerby, an engineer, reported on the iron ores in Kamaun, but repeated attempts to work them ended in financial failure; and a similar attempt by a Calcutta merchant, who started works near Suri, in Birbhum, was also abandoned. The enterprise of the government in the Narbada Valley promised well, and might have been most successful. Works were erected at Burwai, on the Narbada, under the auspices of Colonel Keatinge; Mr. Mitander, a very able Swedish metallurgist, was induced to take charge of the works, and after many experiments all difficulties were overcome, and the works were ready for production of iron. Suddenly, in 1854, the government, after spending £75,000 on these preliminary expenses, dismissed Mr. Mitander, closed the works, and offered them for sale, without success. They have now, with the ground on which they stand, been made over to Holkar. Iron ore and limestone abound in the neighborhood, large forests, furnishing supplies of charcoal, extended for many miles to the east and northeast. No record has been preserved of Mr. Mitander's experiments and plans for burning and storing charcoal and for other processes, which would have been useful at a future time. This year's statement relating to India, referring to these facts, notices that the government are now once more anxious to foster the iron manufacturing industry of India. Last year, Mr. Bauerman was sent out to report on the subject. The increased price of iron is most favorable to the prospect of the manufacture proving profitable in India. The use of Indian coal for smelting iron has never yet been tried

The Aqueducts of Rome.

Mr. I. B. Parker, in an interesting paper embodying some of the results of recent surveys of the engineering works in and about the city of Rome, says:

No city in the world was so well supplied with water as ancient Rome. The aqueducts traverse every part of it, and their remains are interesting, not only to the archæologist, but to the practical engineer, who would know how, in that hot and often dry country, such a boundless supply was maintained.

No less than 19 aqueducts, or streams of water running through Rome, are enumerated in the "Regionary Catalogue" of the fourth century, but only nine are mentioned by Frontinas, who had charge of them in the first century, and who has left an admirable treatise on them. Some of the later aqueducts were merely branches from the main lines.

The principal aqueducts were brought from Sabiaco, 40 miles from Rome, and high in the hills. They were brought with great skill, and show very clever engineering. Where they were not tunnels they were large stone pipes; these stone pipes are each 6 feet high and 2 feet wide. They were not kept full of water, one-third of the upper part being left for air. They were brought by a very gentle descent to the city; the greater part of the way underground, but crossed the gorges on bridges sometimes 100 feet high. The later aqueducts cross the Campagna for the last part of their route, at the hight of 20 feet or more above the ground, forming beautiful arcades. Of the latest and finest, there are still four or five miles of arcade remaining in Roma Vecchia The greater part of this was destroyed in the 16 the century to build a new aqueduct, which was constructed in the roughest manner from the old materials. The aqua Alexandrina was chocked up soon after it was built, in a singular manner, by stalactites; one of the pangs used for it contained so much carbonate of lime in solution, that it speedily filled up miles of the stone pipes.

The celebrated Aqua Marcia has recently been again brought into Rome. The company which has brought this excellent cool water into Rome consisted of English capitalists, aided by the late Mr. Shepherd. The engineers found it expedient to adopt the old plan of the time of the empire. For the first ten miles of its route the water is carried in stone pipes, arches where necessary, just as in the old manner. But, after descending the hill at Tivoli, it is carried in large iron pipes to avoid the detour the old aqueducts were compelled to take.

The Anio Novus is part of the River Anio itself. Great engineering works were made in the time of Claudius and Nero. A great wall, 12 feet thick, being thrown across the river, forming a cascade. Beneath the surface was the entrance to the aqueduct, so that, unless the pipe was full, no water flowed over the wall. This marvelous and successful piece of engineering continued in use for centuries: It was destroyed in the fourteenth century by an ignorant monk, who pierced the foundation to relieve a temporary flood.

The opinion commonly entertained that the ancient Romans were ignorant of the fact that water will always rise to its level in closed vessels is entirely a popular delusion. At every half mile of the aqueducts, on their course to Rome, each aqueduct forms an angle, to break the force of the water, and at that angle a great reservoir is made, with a filtering place at one end. This consists of four vaulted chambers, two above and two below. The water enters into the top of the first upper chamber, it then falls through a hole in the vault into the first lower chamber, then passes through small holes in the intermediate wall into the second lower chamber, then rises through a hole in the vault into the second upper chamber, whence it follows its course at the same level as before. Each filtering bed is therefore built on the principle that water finds its own level. The large stone pipes were used because neither lead nor terra-cotta would withstand the force of the water. At the present time, the iron pipes of the new company burst so frequently that they fear having to relay the whole extent.

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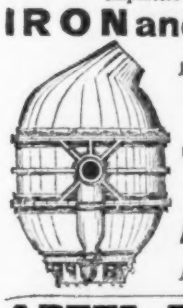
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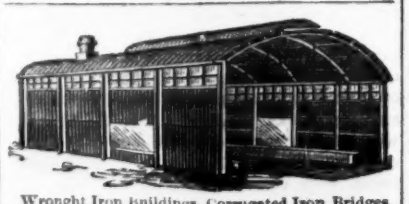
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During the last five years the subject of zinc statuary has become of great importance as a substitute for the more costly castings of bronze. The imitation of the latter metal, obtained by depositing some kind of coating on a white metal basis, can now be carried to great perfection. The cheapness of such products is one of their prominent advantages, a statue, for instance, which in bronze would cost $1200, could be made of zinc, and coated to imitate bronze, for $125.

During the last two years the use of such statuary has extended more rapidly than ever before. We are now exporting these products from New York to all parts of the United States and the Canadas. The great foundries in Germany, where this branch of manufacture was carried on for many years before it was attempted here, also export many statues abroad, but the United States foundries are rapidly gaining upon these European concerns in point of cheapness, while in the matter of workmanship they are already on a par with their German contemporaries, if they do not even excel them. And it is regarded as a certainty, by those who are engaged in the trade, that with the improved machinery which we will be able to employ in this branch of manufacture, five years will not elapse before our products will be on an even footing, as regards price, with those of German workmanship, in spite of their advantage of cheap labor.

THE PROCESS OF MAKING ZINC STATUARY

we give as it is carried on in the North American Iron Works, Williamsburg, L. I. The New York branch of this concern is J. L. Mott & Co., 90 Beekman street. The figure is first modeled in clay, and from this an impression is taken in plaster of Paris. The plaster cast is removed in pieces, the number and shape of the sections being dependent entirely upon the skill and discretion of the workman. Sometimes a small figure not more than 3 feet high is formed of 150 pieces, and the construction of a statue from 50 sections is by no means an uncommon occurrence. In order that the sections of plaster may be removed easily, the dividing line which separate one section from another are determined before the plaster is laid on the clay, and the edges of the various sections are coated with a substance which will prevent their adhering together. Each section is thereafter treated separately, and in the following manner: The face of the section is coated with clay laid on in exactly the same thickness as metal of the statue to be produced. A plaster coating is laid upon the clay, and when this has set, the plaster model and plaster backing are separated and the interior core of clay removed. The two halves of the plaster mold thus formed are placed together again, and the space filled with melted wax, which thus receives the shape of the model and the thickness that is to be given to the metal casting. When the wax has cooled, it is removed from the plaster mold, and from it a mold is made in sand in which is run a peculiar white metal alloy. The advantage of this alloy is its softness, on account of which any changes which it may be necessary to make in the details of the model, may be easily attended to in this pattern. This is the object of casting a white metal pattern instead of casting the object by means of the wax pattern. The metal pattern is generally trimmed and finished with the chisel in order to secure the necessary delicacy of outline.

Sometimes a mold is made in the sand by means of this pattern, and the object cast at once. As it is often required to make many copies of the same model, and the pattern must be preserved, it is generally customary to make another pattern of brass from the white metal pattern, the latter being too soft to be preserved. The brass pattern is made in a sand mold formed from the white metal pattern. The sand used is obtained in Brooklyn, and has a loamy character, peculiarly suitable for zinc and bronze founding, although it does not seem to answer for the casting of iron. Lehigh zinc answers the purposes of this work very well. Sheet zinc cuttings, even though they may contain lead, may be used with equally good results. The melting is generally performed in plumbago crucibles.

From the brass patterns are cast the pieces which are to form the statue. These are then put together like the sections of a Chinese puzzle. Considerable skill is required in this part of the operation. The edges are finally run together with the blow pipe or soldered together. The statue is then finished by filing and chiseling and sand papering, and, as a zinc statue, is then complete. Figures with an abundance of drapery are always more difficult to cast than nude figures, because they require to be made in a great many pieces, and involve what is known as false coreing. Heads and hair are difficult for the same reason.

Various methods are adopted for

BRONZING STATUES.

The one most generally and easily followed, depends on the use of bronze powder. Paint and varish are also used to some extent. In very fine work gold powder is used. It is prepared by grinding gold leaf with honey on a stone slab till a very fine state of division is attained. The mixture is then placed in a basin of water, which is afterward heated to melt and separate the honey from the gold. The mass is then allowed to remain quiet until the gold has settled. Then the water is poured off and fresh quantities added till the honey has been entirely removed. The German gold powder is made from an inferior quality of gold leaf, which contains much silver or copper. The powder known as *aurum mosaicum* is perhaps employed the most frequently in bronzing. The ingredients of which it is composed are tin, one pound, flowers of sulphur seven ounces, purified quicksilver one-half a pound, and sal-ammoniac one-half a pound. The tin is first melted in a crucible, and the quicksilver then added to it. When this mixture has solidified, it is reduced to powder and ground up with the sal-ammoniac and sulphur until the ingredients are thoroughly mixed. The mass is then calcined in a matrass, which leaves the tin as a bright flaky gold powder, the other components of the mixture having been thoroughly expelled by sublimation. Any discolored particles must be removed. When a redder shade is required, a small quantity of red lead is ground up with the *aurum mosaicum*.

In laying the coating upon the object, various methods are followed. Sometimes a cement or gum is used, and the powder having been mixed with it, is laid on with a brush. Sometimes gold size containing a due proportion of turpentine is employed, and the subject covered with it. The subject is then allowed to stand until the coating of size is nearly dry, so that the surface has a clammy feeling, and a piece of soft leather being wrapped around the finger and dipped in the powder, the finger is rubbed over the work, or the powder may be spread on with a soft camel hair pencil. The coating is then allowed to thoroughly dry and the loose powder cleared away with a hair pencil. In this process the principal nicety consists in ascertaining the proper period of dryness for applying the powder, as much of the effect depends upon it. The gold size binds the powder to the ground without the hazard of its rubbing or scaling off.

In bronzing iron a different plan is employed. The process of bronzing gun barrels known as the Damascus method, consists in treating the barrel with dilute nitric acid and vinegar, to which sulphate of copper has been added. In this way metallic copper is deposited irregularly over the iron surface. The latter is then washed, oiled, and rubbed with a hard brush, by which a very pretty appearance is communicated to the barrel. Another method of bronzing iron is the following: The subject is heated to a greater degree than the hand can bear, and German gold, mixed with a small quanity of alcohol varnish, is spread over with a hair pencil. If the iron surface should be polished, it would be necessary to heat it well and moisten it with a linen rag, wet with vinegar, to remove the glare. When it is impracticable, however, to expose the subject to heat, some colored mordant is used, and the bronze powder is spread over the surface when the mordant is half dry.

Of late years the process of

ELECTROTYPING WITH BRONZE

has been developed. This method gives effects which cannot be distinguished in color from the bronze. The coating obtained in this manner also resists the action of the weather. In 1841, M. de Ruolz brought to the attention of the Academy of Sciences, at Paris, a process for depositing on other metals, by the voltaic battery, a bronze coating of variable thickness. In this process the double alkaline cyanides of copper and tin were used. These materials are expensive, but the effects obtained are very beautiful. Mr. Maurice J. Power, before referred to, follows this method on a very large scale, and employs for this purpose baths of various sizes, one of which is 7 feet high, in which large figures may be electrotyped in an erect position. Another bath in the same establishment is 8 feet long by 4 feet wide and 4 feet deep. A Smee battery is employed, the cup having a capacity of six gallons. The advantages claimed for this particular form of battery are the facility with which it may be manipulated and the steadiness of its action. A less expensive method than the above was recommended by MM. Brunel, Bisson and Gaugain. They employ for depositing a brass coating an aqueous solution of 500 parts of carbonate of potash, 20 of chloride of copper, 40 of sulphate of zinc and 250 of nitrate of ammonia. In bronze a tin salt is substituted for the zinc salt. In this solution, wrought or cast iron, steel, lead, zinc, tin, and the alloys of these metals with each other, or with bismuth or antimony, can be coated with bronze. The operation is performed at ordinary temperatures. The article to be coated is put in communication with the negative pole of the battery, and is immersed in the solution just described. At the positive pole is placed a plate of brass, or bronze. When large surfaces are to be coated, the number of plates, not their size, must be increased.

This sketch would be incomplete did it not refer to a department of artistic metal working also developed to a large extent but recently.

ORNAMENTAL IRON WORK

has had for a long time its seat in Derby, England, the quality of whose molding sand is superior to that of most other places. The objection has been urged many times against the use of iron for purposes of ornament, that it is an offense against good taste to replace the forms of stone and marble with iron. Others have claimed that wrought iron alone should be employed for this purpose. The use of the latter material has of late years been mostly confined to railings, church fittings, chandeliers, etc., the material being hammered into the required shape by the use of dies. Many designs which were formerly supposed to be peculiar to hammered wrought iron can now be obtained in nearly equal perfection from cast iron, and the latter has a manifest advantage over wrought iron in that the metal, during the process of founding, swells with greater freedom, so as to adapt itself to all the minutiæ of the mold. Thus indentations or projections in the model, quite impossible or very expensive to attain in copying with wrought iron, are easily transferred to cast iron, and indeed any shape that can be modeled in plastic clay or carved in stone, marble, mahogany or oak, can be given to cast iron. In obtaining a delicacy of outline this material is nearly equal to hammered iron, and there are some designs too delicate to be carved from wood or stone that can be safely represented in cast iron. But, although the latter may assume any of the forms of other materials its hardness, strength, and durability have developed a new style of ornamentation peculiar to itself.

There is no end to the ornamental applications of iron. Conservatories, porticos, balconies, gates, lamps, pillars, vases and fountains are but a few examples of its more important adaptations. The various grades of perfection in which these products are manufactured depend as much on the kind of iron employed as on the skill with which it is worked. A capital, for instance, can be made of tough cast iron, and will endure the influences of the weather better than wrought iron. Malleable cast iron offers special advantages for light ornamental work. If it be made from hematite iron, and afterward annealed, it possesses the properties of wrought iron, and will endure a certain amount of concussion, bending, twisting, and other rough treatment, without fracture. Though such castings are dearer than ordinary castings, they are very much cheaper than elaborately forged iron products.

An important phase of the subject, which we notice in conclusion, is the

PAINTING AND GILDING OF IRON.

In the decorative painting of iron the principal colors employed are red, brown, and yellow ochre. Not only good paint but careful treatment is necessary when the iron work is all of an ornamental character. The sharp lines or delicate forms which have been produced in casting by the molder's skill may be entirely spoilt by paint mixed too thick or carelessly applied.

Good and permanent gilding can only be effected with pure gold. As a rule, gilding should not be spread over large surfaces, and its combinations with color should be so arranged as to assist rather than hide the contrasts of light and shade produced by moldings and other parts in relief. A few gilt moldings or a few gold lines on a spandrel or panel, or a small amount of gold laid upon leaves, rosettes or rivet heads will have a better effect, and suggest greater richness and value in the gold than if used profusely. Chocolate bronze, green, dark green, black and French gray are the colors shown off to the best advantage by gold. Rail spikes, roof spandrels and pendants, and the foliage of capitals, are places where the gilding may be used with the best advantage. In gilding iron work special precautions must be taken to prevent the rust destroying the gold. The following method of gilding is recommended: The iron surface is first carefully cleaned, and then painted with two coats of iron oxide paint of a light color, which is the basis of the gold size afterward laid on. The gold leaf is laid immediately upon the size. The cost of gilding varies with the quality and thickness of the gold coating, as well as the shape of the parts gilded, their position and accessibility and other conditions. It is claimed that when the gilding has been properly effected that the iron work will last from fifteen to thirty years.

George Fritz.

Engineering pays the following tribute to the memory of the late George Fritz, of the Cambria Iron Company:

It is not too much to say that Mr. George Fritz, and his brother, Mr. John Fritz (general manager of the Bethlehem Iron Works), have created the American rail mill, and established the success of the manufacture, chiefly in their radically new system of arranging and working three-high rolls, but largely also in every detail of plant—in heating apparatus, in adaptation of power, in finishing machinery, and in general arrangement; they have put their mark on every feature, not only of the rail mill, but of American rolling mills at large. And despite conflicting ambitions and rival interests, this distinction is generally and freely accorded to the Fritz brothers; and their counsel, in all branches of the iron manufacture, has been universally sought, as of the highest authority.

A sketch of the life and labors of George Fritz cannot fail to be of interest, as illustrating the triumph of mind, not only over matter, but over adverse circumstances of many kinds.

This master in mechanical engineering—this manager whose product per unit of nominal capacity was the largest on record—this diplomatist who held in harmonious relations the largest organization of the kind in America—this practical workman in every branch of the iron and steel manufacture, and of mechanical construction—this well-read student in engineering, in architecture, art, and general literature—this man of the world who earned wealth and position—was a farm laborer until eighteen years of age; was then apprenticed to a carpenter, and was only forty-four years old at the time of his death. His early educational advantages were of the most limited and ordinary kind. Although of massive mold, he was never in thoroughly sound health; and to complete the catalogue of his embarrassments, his right hand was seriously maimed early in his professional career.

It is hardly necessary to say, in view of these facts, that Mr. Fritz was gifted by nature, not only with talents of very high order and great versatility, but with an enormous capacity for work, with vast perseverance, and with a high degree of manliness in his relations with men. Although reserved, and often severe, he was a true friend, especially to the young men and apprentices in the works, in whose training and advancement he took an unusual interest.

Carpentry and its literature at a very early day gave direction and intensity, in the mind of Mr. Fritz, to the pursuit of a vaster subject—architecture. It is probable that few amateurs, in its æsthetical department, have been better read or more keenly appreciative; and it is certain that in its engineering department few experts have been more successful. His practice in iron and timber trusses of large span, in stone and brick structures for every variety of mining and iron-making plant, and in now and then a timber Gothic church roof, or an elegant dwelling house, was not small in amount or variety. His later buildings at the Cambria Works show how much of beauty in form and proportion are strictly compatible with perfect adaptation to uses, and how largely this element can be introduced without increasing cost.

The necessities of his situation led him, at the age of twenty-three, to change the direction of his craft to pattern-making, and this, in turn, opened to him a new department of construction equally congenial to his tastes. How far he was fitted to grapple with the problems of mechanical engineering, in their most difficult adaptations, he who runs may read, through the rolling mills of America. Yet it is not clear to those who best knew him that the pursuit of architecture, considering his extraordinary engineering capacity (so sadly needed by architects at large), and the purity of his taste, would not have led him into a more useful and certainly a more brilliant career.

It is comparatively easy to give an intelligible outline of the works of a master in any other profession. The engineering works of George Fritz were so numerous, and so largely distributed, that a working drawing and specification of the American mill would be necessary to make them plain to the general reader.

Among the more prominent features developed by Mr. Fritz is the three-high mill, before referred to in these columns. In the old form of mill the grooves were in the middle and bottom rolls, so that the piece required turning over after each pass. Messrs. Fritz grooved the bottom and top rolls; the piece does not require turning over, as its two sides come alternately in the bottom of the groove of the top roll, and in the top of the groove of the bottom roll. They made grooving the top roll practicable by inventing the hanging guide. They also applied the carrying rollers, and rearranged the whole system of guides and guards. They were the first to apply direct-acting engines to rail trains, and they constructed, above fifteen years ago, a well-adapted type of vertical engine, which has since been largely copied, and the general features of which have entered into all modern mill engines. They also adapted quick-working engines to saws and finishing machinery. They reorganized the whole system of roll-turning for rolls, so shaping the grooves and proportioning the reductions that the number of bad rails was largely reduced. They overhauled the proportions of puddling and heating furnaces, and doubled their capacity.

Mr. George Fritz invented, and successfully worked, at the first trial, the feeding tables on three-high mills for rolling Bessemer ingots, by means of which a man and two boys pass back and forth, turn over and finish, a 7 inch bloom long enough for three rails out of a 14 inch ingot weighing a ton, in from three to four minutes. These tables have been applied to every blooming mill in America.

At the time of his death he had nearly completed the designs for a pair of blast furnaces of the largest class, and of compound beam blowing engines, of novel form. His arrangement of this work, and his many new features in hot blast stoves, and in details generally, will undoubtedly prove, like his other works, a mine of valuable information to the iron interest at large.

Mr. John Fritz took the management of the Cambria Works in 1854; George, who had by this time become an expert machinist, being his assistant. In 1860 John went away to build the Bethlehem Iron Works; George had by this time mastered the business at large, and up to the time of his death was in charge of construction and manufacture in the largest rail works in America. He built most of the present structures, including the Bessemer Works, and was in charge of all the engineering of coal and iron mines, coke works, blast furnaces, puddle and rolling mills, steel works, shops and transportation; and on nearly every feature of all this accumulation of plant and machinery, he left the impress of his ingenuity and judgment.

A remarkable feature of Mr. Fritz's engineering career—so prominent as to be generally noticed and commented upon—remains to be mentioned. His novelties always worked well at the *first trial*. Even so difficult a thing as the feeding into rolls of long, crooked, red hot blooms of steel, weighing a ton each, by easily controlled and durable machinery, worked successfully from the start, although durability was promoted by subsequent changes in proportions. Mr. Fritz always thought out his plans in much detail, before putting pencil to paper.

The tribute of respect paid to Mr. Fritz, on the occasion of his funeral, by the profession, and by the representatives of the iron interest of America, and by the multitude of men with whom he had been associated—many of whom he had guided from their boyhood into positions of responsibility—was wide spread and spontaneous. He was buried in Johnstown, among the scenes of his great labors.

By the use of thin leaves of steel in the construction of artificial magnets, a French scientist has so increased their power as to construct one weighing about four and a half pounds, which could carry a weight of ninety-nine pounds. The great advantage to be expected from this discovery is the reduction in the weight of the magneto-electric machines of all kinds, and especially those employed in the production of light.

The new Carew paper mills, at South Hadley Falls, Mass., are to have a Chapman turbine water wheel manufactured by the Clark & Chapman Machine Company.

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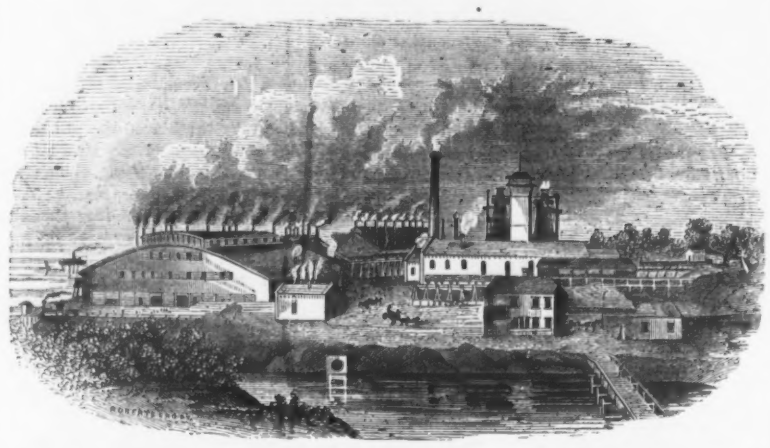

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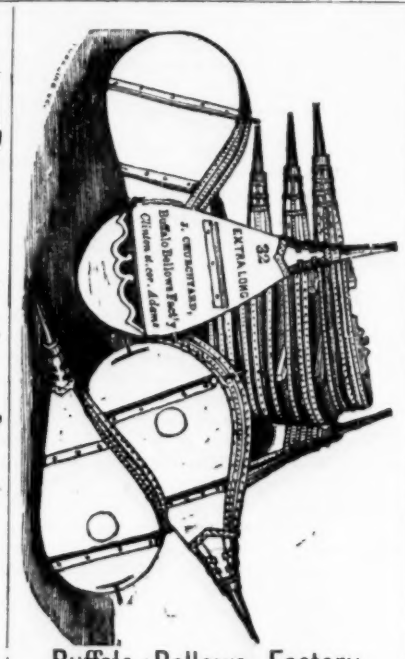

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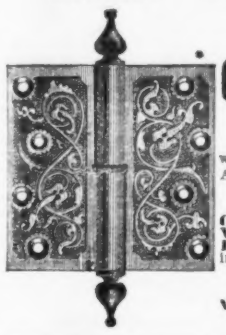

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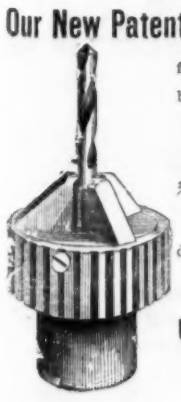

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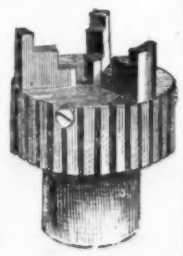


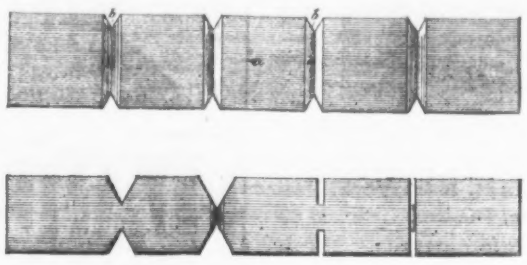
New Patents.

We take from the records of the patent office at Washington the following specifications of certain patents lately issued, which will be found interesting:

Specification forming part of Letters Patent No. 140,762, dated July 15, 1873, issued to Ogden Bolton, Jr., of Pittsburgh, Pa.

IMPROVEMENT IN THE MANUFACTURE OF STEEL PLATES.

The nature of this invention relates to the manufacture of steel; and consists in running the metal from a steel melting furnace or Bessemer converter into molds so that the ingot or ingots formed have a recess or recesses cast in them; and in the manufacture of mild steel plates such as are usually employed for boiler plate—if the ingots are cast without recesses, cutting the ingot into any suitable size, and reducing the pieces to plates or sheets, as will be more fully set forth hereafter.



IMPROVED FORM OF STEEL INGOTS.

The accompany drawings show plan views of ingots cast with recesses.

In the manufacture of steel by the Bessemer converter or steel melting furnaces the steel is either cast in single ingots or in groups. In casting several single ingots the difficulties are various—the steel may clog in the nozzle, causing a skull in the ladle, or the stoppers may burn or break, causing a waste of steel. In casting groups of ingots, the connection between the center and other ingots, called sprues, are waste, as also a portion or all of the center ingot.

To obviate these difficulties a heat is cast from either a steel melting furnace or Bessemer converter into one or more ingots, *a*, having recesses *b* formed in them. These recesses are formed by corresponding projections in the mold or molds. Where one mold only is used for the whole heat the steel may be run direct from the furnace or converter. These ingots can then be broken up or cut, by means of circular saws or other suitable instruments, into pieces.

In the manufacture of soft steel, such as is used for boiler plate, the advantage of running the whole heat from a Bessemer converter or melting furnace into one or only a few ingots is greater than in higher grades of steel. The steel is then run into a mold or molds, and the ingots may have a recess or recesses cast in them, and then, by means of falling weights, circular saws, or other suitable instruments, may be divided into pieces, or the ingots may have the recesses formed in them after being cast and then be divided. Where the ingots are cast double or more than double the size required for a plate the ingots may be first partially rolled, then cut, and placed in the furnace again, and finished in the ordinary way.

Claim.—1. The method described of casting an ingot of steel with a recess or recesses.

2. The method described of manufacturing soft steel plates.

IMPROVEMENT IN PROCESSES FOR PREPARING IRON CHIPS, &C., FOR REMELTING.

Specification forming part of Letters Patent No. 140,383, dated July 1, 1873, issued to Abiel Pevey, of Portland, Me.:

The nature of this invention consists in aggregating, or massing together, such iron chips, borings, scraps, turnings, shavings, and other pieces or particles, after wetting or mixing them with a solution of lime in water (or whitewash) and beer returns, or sour beer, or any liquid of a sticky nature (which also serves as a flux), into a core, or cake, by ramming or pressing them into a core-box of a conical, or

IMPROVED APPARATUS FOR PREPARING IRON CHIPS, &C., FOR REMELTING.—*Fig.* 3.

other convenient shape, and inclosing said core in a continuous cast iron shell, basket, or netting, by running said basket, or netting, or shell, about said core in a flask of shape similar to that of the core-box, and properly grooved, as hereinafter described, the object being to hold said pieces and particles of iron together for purposes of handling and transportation, and also to prevent them from being blown out of the furnace by the blast while melting.

Figure 1 is a plan of the flask, or mold, with trunnions, showing the grooves running from the top to the bottom of the flask. Fig. 2 is an elevation of a flask, or mold, provided with trunnions and a crank, and supported upon uprights. Fig. 3 is a plan of the core inclosed with the cast iron basket.

The purpose of the invention is accomplished substantially as follows: Mix slacked lime (or any other substance which is sticky and also acts as a flux, or promotes the fusion of iron) and water or sour beer, or beer returns, until the mixture is of about the consistency of cream. With this mixture dampen the iron particles. Then place a small quantity of these dampened iron particles in the core box, which is shaped like the frustum of an inverted cone, and ram them down hard, and fill the core box by gradually pressing or ramming down small quantities at a time of the moistened iron particles until the core box is full. The top of the core is made round or flat. Then a concavo-convex or flat plate is placed upon the top of the core box with the concave or flat surface, as the case may be, turned down against the core. The core box, with the plate still on it, is then inverted, and the core box is lifted from the plate, leaving the core resting upon said plate. The core is less liable to crumble when the small end is up. The core is then lifted by the plate and placed in an oven to dry, or it may be dried merely by exposure to the atmosphere. The core box has radial ribs or corrugations on the bottom, on the inside, and these cause the bottom of core to have radial grooves. After being dried so that it can be handled the core is placed with its small end down in the flask, (Figures 1 and 2), which flask is in shape like the core box, the core coming to within about an inch from the top of the flask—that is, the flask is about an inch longer on the inside than the core, and the core fits the flask except that the flask has a number of semicircular recesses or grooves running from top to bottom on its inside, as shown at D in Fig. 1. On the top of the flask is then placed a fender, being a flat ring of cast iron, having on its under side lips which keep said fender in its place on the flask. The fender keeps the melted iron from flying if the flask happens to be too cold or damp, but may be dispensed with, if sufficient care is taken to heat the flask before pouring. Melted iron is then poured on to the center of the top of the core or cake, filling the grooves in the flask and also filling the grooves in the bottom of the core, and, finally, covering the top of the core with a thin layer of cast iron. Sometimes the melted iron raises the core in the flask, in which case the entire core may be covered with a sheet of cast iron. As soon as the cast iron hardens the flask is inverted by means of the crank E (Fig. 2), another core is placed in the flask, and the operation is repeated, thus repeating the operation without interruption to any extent required, leaving the core or cakes perfectly free from sand and any and all non-conducting properties. The core after being thus inclosed is ready for remelting, or for transportation.

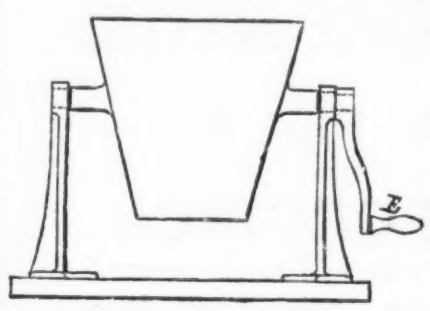


Fig. 2.

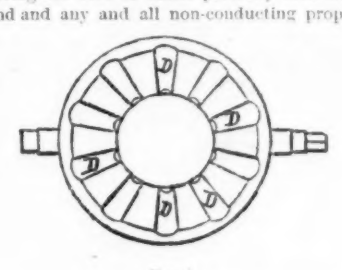


Fig. 1.

The cost of preparing iron particles for remelting by the above process is slight. The lime acts as a flux, and improves the quality of the iron, and there is no substance in the cores, as thus prepared, which has any tendency to clog the furnace, or produce slag, and the cores, or blocks, when thus inclosed, or partially inclosed, may be transported.

Claim—1. The method herein described of forming a core, or block, of iron chips, scraps, or other small pieces or particles or iron.

2. The method herein described of forming a core, or block of iron chips, scraps, or other small pieces or particles of iron, by wetting said pieces or particles of iron with a solution of lime in water, and then pressing said pieces or particles into molds.

3. The method of uniting pieces or particles of iron into a core, cake, or block, by wetting said pieces or particles of iron with a liquid solution of lime, and then pressing them together, as and for the purpose herein described.

President Bayliss, of the Massillon Iron and Coal Company, says if nothing unforeseen takes place the rolling mill will be making iron, at the furthest calculation, by the 1st of December. Ten heating furnaces are already placed in their proper position, the boilers and the furnaces are nearly ready, the wood work is nearly completed, the iron work being rapidly pushed to completion, and the engines and machinery are taking their proper places. The mill is sufficient for thirty heating furnaces, but will be started with ten; others will be added as the business increases.

Preserving the Edges of Engineers' Cutting Tools.

In these times of dear labor every feasible system which aims at economizing that commodity is entitled to consideration from such persons as have interests that may be affected by the economy. Labor-saving appliances were never so much in demand in the whole history of mechanical science as they are at the present time, and hence no apology is required at our hands for bringing under the notice of our readers an account of some results that have lately been accomplished in connection with the economy of iron turning.

The wear and tear of cutting tools in iron turning may be greatly diminished by the application of the system of which we are about to speak; but still more important is the fact that an immense economy may be effected, both as regards time and expensive machinery. As every practical engineer and iron turner well knows, a turning tool deteriorates in cutting power in proportion to the temperature to which it is permitted to rise in the operation; in other words, if a turning tool, providing that it is of the proper quality as to hardness and toughness, be kept perfectly, or, at all events, moderately cool, its cutting power is most surprisingly prolonged. But the ordinary method that has hitherto been in operation for cooling, or attempting to cool, cutting tools while in action, is very ineffective, inasmuch as the water used as the cooling agent cannot possibly get at the cutting edge of the tool. How could it possibly be otherwise, seeing that the stream of water is allowed to fall upon the shaving that is in course of being removed, while the cutting edge of the tool is imbedded more or less deeply in the substance of the mass of iron in course of being turned? An invention by Mr. Joshua Horton, of Glasgow, designed to remedy the defects of methods now in use, is thus described by *Engineering*:

The method of applying the system of cooling the cutting edge of turning tools is to connect the delivery tube with the street water mains, or with an overhead cistern provided with a ball-cock top, or any form of reservoir capable of affording the desired pressure and continuity of current, which latter is delivered through a fine nozzle immediately underneath the interior extremity of the turning tool. A pressure of 10 ft. is generally found in practice to be quite sufficient, but there is no objection to using a presure of 50 ft. or 100 ft., inasmuch as it can be regulated and controlled by the stop-cock with which the apparatus is provided.

The sources of economy obtained by this system are obvious. In the first place, as the turning tool remains quite cool, the lathe may be run at a much greater speed than is usually the case, which means that a great deal more work may be done in the same lathe, or the same amount of work in a smaller number of lathes. From the results of numerous trials extending over several months, the fact has been abundantly demonstrated that the ordinary rate of cutting may be doubled without any injury to the tool, while in finishing a very high speed is possible. The increase of speed, or rather of work done, has been observed to vary from 100 up to 700 per cent., and in rather one exceptional case the increase has been 900 per cent. In two instances, where chilled cast iron rollers for paper-making machines were being turned, the work done was increased 400 per cent. In any case, where there is sufficient belt power, the increased speed need never be less than 100 per cent.; for this reason, namely, that a tool while cool will cut at double the speed that is possible when it is hot, and at whatever speed a tool may be working by the ordinary imperfect method of cooling, it may be doubled if the water jet is applied. It may now be taken as an established fact that the tool need be no longer the measure of speed at which a lathe may be driven, inasmuch as many of the most powerful lathes in the kingdom could not be driven with the "cut" and "feed" which the tools would withstand with the greatest of ease. Depth of cut and "feed" seem not to affect the tool if it is properly cooled. These facts have a most important bearing upon the progress of the engineering trade, now that labor is so scarce at home, and competition abroad is so keen.

By employing this system of cooling the cutting tools, it is possible to turn up the hardened tires of locomotives at the same speed as those which have not been running; and, indeed, tires which could not be turned at the slowest speed with which the lathe could be driven, and had to be put aside on account of being so hard, were afterward completed with a single tool, and at the ordinary speed of new tires. This has been thoroughly demonstrated by Mr. Wheatley, at the North British Railway workshops at Cowlairs, near Glasgow, on tires that had been running two or three years.

Already many of our most eminent engineering firms have adopted it to a greater or less extent. Some have got it applied to all their lathes, and others are practically testing its value for their own special satisfaction. It will at once be concluded that the invention of Mr. Horton is of much value, when we mention that such firms as the following have practically tested it in their works, and are now being supplied with the necessary apparatus for carrying it out: Sir William Armstrong & Co., Hawthorn; Palmer Brothers; Sir Joseph Whitworth & Co.; Sharp, Stewart & Co.; Hick, Hargreaves & Co.; James Watt & Co., Soho Works; Fawcett, Preston & Co., Liverpool; the Manchester, Sheffield & Lincolnshire Railway Company, at their Gorton Works; with various other firms at Liverpool, Salford, Bolton, Burnley, Accrington, Barrow-in-Furness, Glasgow, and other places on the Clyde, Leith, Kircaldy, Dundee, Aberdeen, Belfast, &c.

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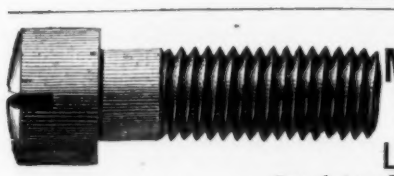

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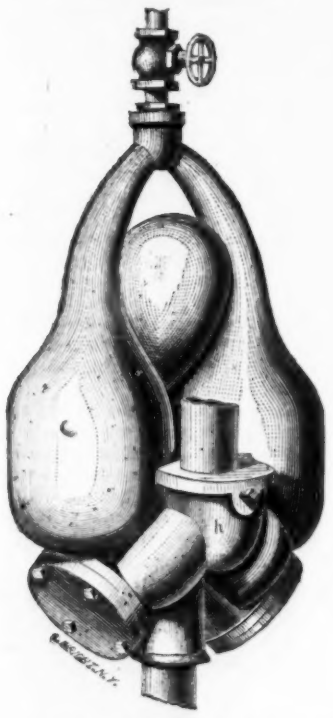

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Will pump gritty or muddy water without wear or injury to its parts. It cannot get out of order.

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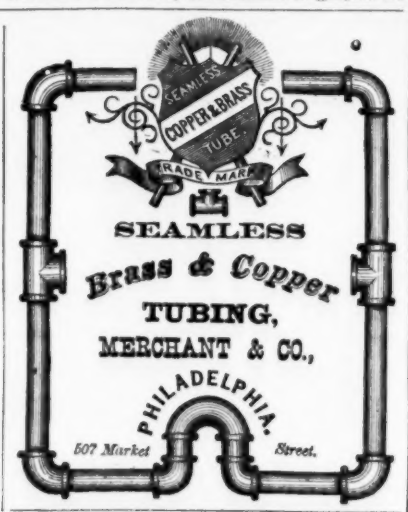

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BRASS WORK of all kinds,

FITTINGS FOR

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PLAIN AND GALVANIZED

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Business Established, 1836. Incorporated, 1872.

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CHAS. E. LITTLE,

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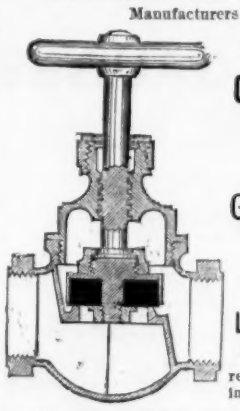

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All Iron Wheel Barrows

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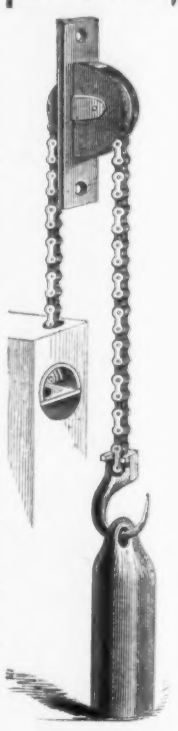

And patented attachments for same, for suspending windows, from 100 to 1500 lbs. Sashes can be suspended with my Chain and attachments in a shorter time and with less trouble than by using the ordinary common cord. I am now offering the Chain and fastenings cheaper than any other in the market. Also manufacturer of the MORTON & BREMNER'S Straight and Circular Spring Balances. Established in 1842.

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Chain and Pulley for Heavy Sash

F. & L. MANY & MARSHALL,

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BUILDERS' HARDWARE,

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Agents for Gautier's Black Lead Crucibles.

Agency and Depot of the TRENTON LOCK COMPANY.

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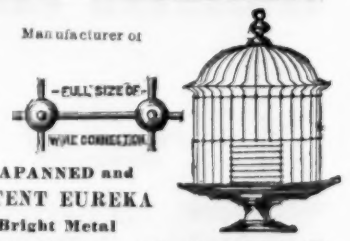

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And sold by their Agents in all the leading cities and towns of the country.

The Scales made by this Company possess *valuable patented improvements* over all others. They have taken more first-class Premiums than *all others* during the past *ten years*. The Brandon Manufacturing Company guarantee all goods made by them to *prove satisfactory and superior to any other make.*

Call and examine their goods, or send for Circulars and Price Lists to

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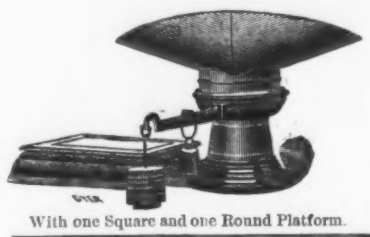
Or their Warehouses and at the following places:



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We learn that certain parties are making and selling **Second quality and inferior** Planes stamped, **"A.C. Bartlett's Ohio Planes."** There is no such manufacturer of planes. The object is obvious, as our planes have been known as **OHIO** planes for the past 25 years. First quality planes of our make are stamped **OHIO TOOL CO., COLUMBUS.**

September 17, 1878.

Ford's Pat. Stove for Heating Air for Blast Furnaces

Adopted at 13 different Furnaces.

West Point Foundry,

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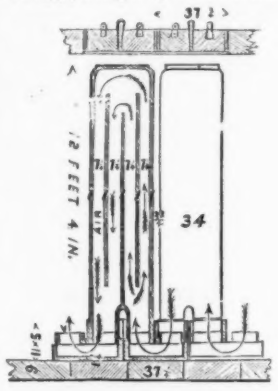
PAULDING, KEMBLE & Co.

30 BROADWAY, NEW YORK, sole Proprietors for the United States

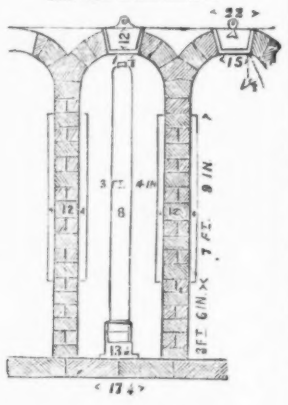
JOSEPH CRAMPTON, Agent,

23 19th Street, Pittsburgh, Pa.

Showing pipes lengthways in one section.



End view of one section.



REFERENCE.

PHILADELPHIA, Nov. 16, 1872.

PAULDING, KEMBLE & CO.:

GENTLEMEN: We have five sections of the "Ford's" Ovens in use since blowing in our new Furnace on the 21st of October. The Ovens have given entire satisfaction; we consider them superior to any Cast Iron Oven in use; they heat the air to a greater degree with much less gas and heat on the brickwork than the Player Ovens; they cost less for construction, and, we believe, will prove more durable, and less expensive to keep in repair. Our main difficulty thus far has been to keep the heat down to 1000 deg; our average is from 1100 to 1200 deg.

In all cases the Cast Iron Key Boxes to form the arch should be filled in lightly with fire-brick blocks, laid dry and covered with loam, or, *better*, a cast iron plate, to cover the top, with a ring in it, so as to be easily removed.

We built our ovens in one block, entirely of *fire brick;* the cost of the brick work entire was about 5000 dollars, say about 1000 for each oven.

We put 4 courses of fire-brick in the bottom, laid on a loose slate rock, laid dry, and well grouted each course with Kaolin grout.

We can recommend the Ford Ovens with great confidence to iron men who wish to construct the best kind of ovens in use in the United States. Yours, truly, J. B. MOORHEAD & CO.

P. S.—Our Furnace is now on her 3d week, making about 28 tons per day good Foundry Iron—15 feet bosh, 50 feet high.

Embossed Dog Collars.

An Improved Style of Dog Collar made of Oroide and embossed with Fancy Patterns, which Prevents their becoming tarnished or scratched. Also, German Silver, Silver Plated and Bronzed.

Manufactured by

W. T. & J. MERSEREAU,
62 Duane Street, NEW YORK.

For Sale to the Trade only.

Something New for

OTIS FURNACES & MINES.

New Union Steam Safety Elevator,

How One Works.

RIVERSIDE IRON WORKS, DEWEY, VANCE & Co., Wheeling, W. Va., January 14th, 1873.

Messrs. OTIS BROTHERS & Co., New York.

Dear Sirs: The experience of a year proves that *your Furnace Elevator is superior to all others in use.* We have in the six weeks from December 1st to Sunday last, 12th inst., made *2724 tons, 1401 lbs. Pig Metal,* or an average of near *65 tons per day,* which required the elevator to *lift 72 feet high* 4¼ tons Ore, Coke and Limestone for each ton of metal produced, or *more than 11,500 tons material in the 6 weeks.* The largest yield in *one* day was *81 1-4 tons* Iron, involving the lifting of *345 tons* material *in 24 hours.* This has all been done to *our satisfaction,* and that, too, in the *coldest weather we have had.* Other furnaces with *water* and *pneumatic hoists* have experienced *great difficulty,* on account of the *water freezing* in the *tanks;* and in the case of the *air* hoists, we understand that two furnaces, not far from us, *had* to *"blow out."* from being *unable to hoist stock* during the *"cold snap."* The difficulty, we are told, was caused by the *condensed moisture* in the *blast freezing to the sides of the cylinders,* so that the *piston could not move* up or down.

Very truly, yours, DEWEY, VANCE & Co.

Send for Circular to

OTIS BROTHERS & CO.

348 Broadway, NEW YORK.

BUSINESS ITEMS.

NEW YORK.

The establishment of E. Remington & Sons, at Ilion, turns out a yearly product of 40,000 cultivator teeth, 10,000 dozen hoes and rakes, 5000 plows, 2500 mowers and reapers, 500 cotton gins, a large amount of bridge work, &c. Their specialty is the Remington rifles, for which they receive large contracts from all parts of the world. These arms were first brought into notice in 1866, and very soon after the company received a contract from the Danish government for 20,000. Since that time large orders have been filled for the United States army and navy, France, Spain, Japan, Rome, South America, Sweden, Egypt, and various other places. Already they have constructed over half a million arms in the aggregate, the greater portion of which have been supplied to troops. In the armory alone the company employ 2400 men.

PENNSYLVANIA.

The Gibbs & Sterrett Mfg. Co., of Corry, are employing about one hundred hands, building steam engines and the Climax mower and reaper. They succeed the Climax Mower & Reaper Co.

The Corry Furniture Co. employ fifty hands and make about 100 bedsteads per day, of five different patterns; they also manufacture large numbers of lard and pork barrels, staves and heading for the Boston market. There are four barrel factories here, employing about 100 men, and turning out from 500 to 700 oil barrels per day. The citizens are offering strong inducements to manufacturers to locate here, and the prospect is quite encouraging for the early erection of a charcoal blast furnace.

The Corry Mfg. & Lumber Co. employ 200 hands and have one of the largest and finest tub and bucket factories in the country. They have a narrow gauge railroad, with locomotive and cars for the transportation of lumber and timber from their mills, located seven miles from town, on their timber tract of 1500 acres.

Georgiana furnace, two miles from Dauphin, Dauphin county, was blown in on the 24th ult., after being thoroughly repaired.

The Kittanning rolling mill, which originally cost $100,000, has been sold for $20,601. It was subject to a mortgage of $12,500.

Messrs. Gemmill & Hawthorne have erected new boiler works near the Ormsby furnace, Sharpsville, very much increasing their facilities.

The striking of the puddlers at the Columbia Steel and Iron Company's mill resulted in the paying off of the old force and the employment of new men. The former threatening the latter with bodily injury, forty extra policemen have been sworn in by the borough council to protect the workmen and preserve the peace.

The Cambria Iron Company, Johnstown, give notice that, owing to the monetary crisis and the low price of iron, they have but two alternatives: either to close the works entirely, or to reduce the price of manufacture. They have chosen the latter, and announce that on and after the 1st day of October the current wages of employees not regulated by the gold value of iron will be reduced from 10 to 12 per cent. It is said the employees will cheerfully accept the situation.

The Pennsylvania Iron Works, at Danville, claim the honor of having been the first in the country to manufacture the T rail. It was done October 8th, 1845, for the Lancaster and Harrisburg Railroad.

John Griffiths, of Philadelphia, has been awarded the contract to build the new sloop-of-war at Kittery Navy Yard at $45,000.

Notices have been posted up in the Allentown Rolling Mill, informing employees that the wages of all receiving more than $2 per day are to be reduced 15 per cent., and of all receiving less than $2 per day, 10 per cent.

The Philadelphia and Reading Railroad Company are erecting an immense ship yard, which, when completed, will be the largest concern of the kind in the country. The building is 120 feet wide, and 497 feet long. The blacksmith shop is 153 feet long by 53½ feet wide. The pattern shop is 40 feet by 60 feet. A wharf 400 feet long is being built. The company will build all its steam collieries and other vessels used in the coal traffic.

Scranton will soon have a new manufacturing establishment—an axe and edge tool factory. The buildings are in course of erection.

Twenty-five per cent. of the force of workmen employed by the Dickson Manufacturing Company, of Scranton, have been discharged, and the wages of those retained reduced 10 per cent. This is owing to the countermanding of orders for locomotives by railroads affected by the financial troubles.

MASSACHUSETTS.

The Upham Machine Company is putting up a new machine shop of brick, 140x50 feet, near the station in Athol.

The New England Iron Company has received the contract for a new iron bridge over the Boston and Providence Railroad, at River street, Hyde Park. It will be considerably larger than the present one.

The Novelty Steam Heating Company, of Westfield, has been resolved into a joint-stock company, with the following gentlemen as officers: President, E. B. Light; treasurer, H. E. Light; directors, E. B. Light, H. E. Light, A. C. Baker, C. S. Smith, H. N. Gardner and G. L. Laflin.

B. F. Sturtevant's pressure blower, which was introduced only seven years ago, is now in general use throughout the United States, and is adopted wherever it is known. At the present time over eight thousand of these blowers and exhaust fans are in use, and giving the fullest satisfaction, in factories of various kinds, rolling mills, etc. At his factory in Sudbury street, Boston, Mr. Sturtevant employs over 100 hands constantly, and turns out 40 to 50 blowers per week. These range in size from that adapted to jeweler's use, to that required in the largest rolling mill. For purposes of ventilation these blowers have been found to surpass every other device, and are used in mines, public buildings, etc., with complete success. The capitol at Washington is thoroughly ventilated by four of Sturtevant's blowers.

VERMONT.

The Montpelier Manufacturing Company have a capital of $80,000, and during the past year their profits were $13,272·89. The coming year the manufacturers contemplate turning out about 10,000 children's carriages, 10,000 sleds, and about 2500 velocipedes.

It is understood that the Woodstock Iron Works have been sold for about $25,000 to the River Du Loup Railway Company.

OHIO.

A certificate for the incorporation of the Linndale Stove and Hollow Ware Manufacturing Company, with $500,000 capital, has been filed at Columbus.

The Straitsville Furnace Company, of Straitsville, Perry county, with a capital stock of $100,000, in shares of $100, has filed a certificate of incorporation with the Secretary of the State. The corporators are Sandusky men.

A company of capitalists is being formed by Harvey Wells, in Vinton county, to erect furnaces and lay out a manufacturing city.

Theodore Tallmadge, Lewis Evans and Mr. Hull are about to erect two iron furnaces and a rolling mill three miles south of Nelsonville, at the junction of Snow Fork with Sunday Creek, and on the line of the Baltimore and Ohio Railroad. They will also open a coal mine.

The Aultman & Taylor Manufacturing Company, of Mansfield, is engaged in the manufacture of the Aultman & Taylor threshing machine and horse-power. They have a paid in capital of $251,500, a surplus fund of $80,000, and do a business of $400,000 per annum. C. Aultman, of Canton, is president, and Henry F. Taylor, of Chicago, is vice-president. The company emyloy over 200 men, and pay out in wages about $10,000 per month. For the past two years they have been unable to supply the demand for their machines. This year they are supplying 504 machines, whereas 800 were ordered.

The new furnace of the Iron and Steel Company, at Ironton, is to be built in such a manner that it can be changed at any time to a Ferri furnace. Its hight will be 53 feet, and it will be 15½ feet at boshes. The furnace will contain three hot blast ovens and two engines.

The Star Furnace, at Portsmouth, has been blown out to enable the company to make necessary improvements.

MICHIGAN.

The Beecher Furnace, Marquette, which was recently rebuilt and altered to more modern style, has been blown out, and is to receive a new hearth and back lining. The brick was of an inferior quality, as it burned out up to the tuyeres. The charge has been withdrawn, and it will immediately be relined with a better quality of brick. This will cause a suspension of only a few weeks.

WEST VIRGINIA.

There is some talk of a rolling mill and locomotive works being built at Huntington. A car wheel foundry is now in process of erection, and the place will soon be quite a manufacturing center. Huntington is the western terminus of the Chesapeake and Ohio Railroad.

VIRGINIA.

Owing to the financial panic the Tredegar Iron Works Company, of Richmond, discharged between 600 and 700 workmen employed in car building, on Friday of last week.

INDIANA.

The Ohio Falls Car & Locomotive Company, of Jeffersonville, employing 700 men, have stopped work in all its shops except the foundry. The Southwestern Car Company has also reduced its force. The stoppage is due to inability to obtain currency to pay the men. The shipyards of Dawes, Howard & Co., employing a heavy force, paid two-thirds wages. A reduction of force has been made, but the boats now on the stocks will be finished.

The Bottom of the Atlantic Ocean.

The main theatre of sounding operations has been the Atlantic Ocean, which, from its relation to the leading commercial nations, and for intercontinental telegraphic purposes, has been more carefully surveyed than any other great body of water. Open from pole to pole, participating in all conditions of climate, communicating freely with other seas, and covering 30,000,000 square miles, it is believed to represent general oceanic conditions, and to contain depths nearly, if not quite, as great as the other ocean basins of the world, although but little is known, it is true, in this respect of the Indian, Antartic and Pacific seas. The general result of its soundings would indicate that the average depth of the Atlantic bed is not much more than 12,000 feet, and there seems to be few depressions deeper than 15,000 or 20,000 feet, a little more than the hight of Mount Blanc. Dr. Thomson sums up the general results of the Atlantic soundings as follows: 'In the Arctic Sea there is deep water reaching to 9000 feet to the west and southwest of Spitzbergen. Extending from the coast of Norway, and including Iceland, the Faroe Islands, Shetland and Orkney, Great Britain and Ireland, and the bed of the North Sea to the coast of France, there is a wide plateau, on which the depth rarely reaches 3000 feet; but to the west of Ireland, and communicating with the Spitzbergen Sea, a trough 500 miles wide, and in some places nearly 12,000 feet deep, curves along the east coast of Greenland. This is the path of one of the great Arctic currents. After sloping gradually to a depth of 3000 feet to the westward of the coast of Ireland, in latitude 52°, the bottom suddenly dips 10,000 feet at the rate of 15 to 19 feet in the 100, and from this point to within about 200 miles of the coast of Newfoundland, when it begins to shoal again, there is a vast undulating submarine plain, averaging about 12,000 feet in depth below the surface—the "telegraphic plateau." A valley about five hundred miles wide, and with a mean depth of 15,000 feet, stretches from off the southwest coast of Ireland, along the coast of Europe, dipping into the Bay of Biscay, past the Strait of Gibraltar, and along the west coast of Africa. Opposite the Cape de Verde Islands it seems to emerge into a slightly deeper trough, which occupies the axis of the South Atlantic, and passes into the Antarctic Sea. A nearly similar valley curves around the coast of North America, about 12,000 feet in depth, off Newfoundland and Labrador, and becoming considerably deeper to the southward, where it follows the outline of the coast of the States and the Bahama and Windward Islands, and finally joins the central trough of the South Atlantic off the coast of Brazil, with a depth of 15,000 feet.—*Popular Science Monthly.*

HENRY DISSTON & SONS'

SAW, TOOL,

STEEL AND FILE WORKS,

Front and Laurel Streets,

PHILADELPHIA, PA.

H. W. PEACE,

MANUFACTURER OF

SAWS OF ALL KINDS.

FACTORY, WILLIAMSBURGH, N. Y.

AMERICAN SAW CO.,

No. 1 FERRY STREET, NEW YORK.

Solid saws require frequent gumming, thereby subjecting them to risk of springing or breaking. This is especially the case with cross cuts having *Patent Teeth*. In the perforated saws **all gumming is avoided,** and the teeth are easily kept long and in *proper shape*, saving *files, labor, expense* and *vexation*. As is well known, our saws cut faster, smoother and easier than any other.

MOVABLE-TOOTHED CIRCULAR SAWS AND SOLID SAWS OF ALL KINDS.

GEORGE GUEUTAL,

39 West 4th St., New York.

IMPORTER OF

Wood Screws, Steel in Sheets,

BAND SAWS, TOOLS FOR BRAZING, &c.

Bed Screws, Pin Hinges, and Wire Nails a Specialty.

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UNDERGROUND; or, Life Below the Surface.

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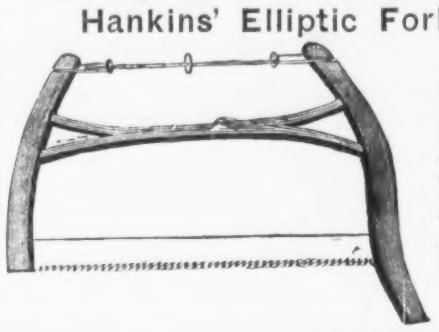

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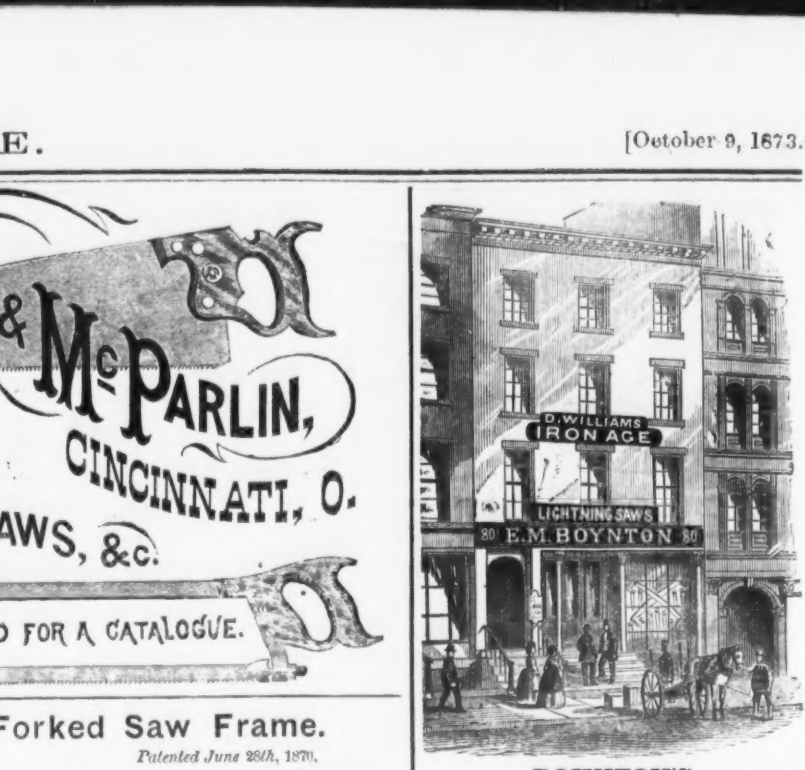

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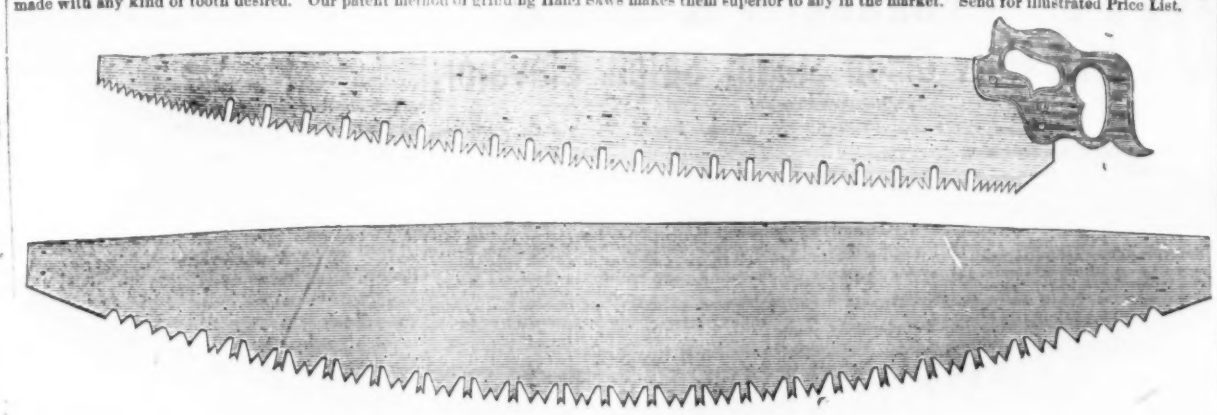

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CINCINNATI INDUSTRIAL EXPOSITION.

POWER HALL.

The west side of Power Hall is nearly filled with steam pumps, the largest of which is made by the well known manufacturers, Cope & Maxwell, Hamilton, O., and which has a capacity of 3000 gallons per minute, at regular working speed; the valve movement is combined positive and automatic, and the water valves open in such a way as to permit the full volume of water to pass without obstruction. They exhibit a full line of their pumps of different sizes.

John A. McGowan & Co., Cincinnati, have a full line of hand and steam pumps and boiler feeders on exhibition. Their I. X. L. steam pump has an auxiliary steam piston, which is designed to overcome the dead point of the main crank. They also exhibit a large card board of brass goods for machinists, steam fire engine builders, and general brass castings of their own manufacture. They are the agents for the Buffalo steam gauge, samples of which are on exhibition, and the Northampton Emery Wheel Co., of which they show a full line, including machines.

The McGowan Pump Co., Cincinnati, furnish the pump which supplies the cascade in Floral Hall, which has, with ordinary running, a capacity of 550 gallons per minute. It is so constructed as to produce a constant suction as well as a constant discharge. Another of their pumps supplies the larger battery of boilers. They manufacture steam pumps for all purposes.

The Barney & Smith Manufacturing Co., the well known car builders of Dayton, O., exhibit a new pump of their manufacture, which they have named the Dayton Cam Pump. It is a direct and double-acting steam pump, especially designed for railroad men. The steam valve is worked by a cam bolted on the piston rod and moving with it. By the shape of the cam the stroke is slowed down at each end to give time for the water cylinder to fill, and the dead points are so completely overcome that the pump will run at a speed not exceeding one revolution in ten minutes.

W. & B Douglas, of Middletown, Conn., make, through their agent, Mr. F. G. Holton, of Cincinnati, a good display of pumps of their manufacture; while the "Pulsometer" keeps up a constant throbbing in another part of the hall.

The Cincinnati Brass Works exhibit a case of automatic oil feeders, of new design, having adjustable needle oscillating valve; also a telescopic whistle for varying the sound of steam whistles by simply telescoping the bell.

Messrs. Vanduzen & Tift, of Cincinnati, exhibit bells of different sizes, from small hand bells to one weighing over 1300 lbs., which was made from a bronze cannon that was cast in France, May 16, 1733, the butt end of which is on exhibition in the department devoted to Natural History. It was captured by Gen. Scott at Vera Cruz, and originally weighed 3320 lbs.

The center of Power Hall is devoted to wood working machinery, the largest display being made by Messrs. J. A. Fay & Co., Cincinnati, who exhibit a new machine for filing and setting hand saws, a complete and perfect working machine, operating automatically, so that the saw is moved forward, set and filed without any assistance, and again moving on to the next tooth when the filing has reached a fixed depth which may be adjusted as desired. They have two of their band saws in operation, which have been materially improved since last year. They also exhibit a blind stile borer, spacing and boring regularly; a new cabinet planer to take the place of the large planer, where only a light amount of work is required; a small horizontal borer, which is very complete, enabling the operator to bore at any angle desired, the table having six different motions; a car planing machine, made to cut both forward and backward, with adjustable stops to any depth. By an adjustable stopper the machine is stopped at any point and made to return, if desired; also, a large planer, a surface and flooring machine combined, and a universal saw, conveniently arranged for the operator to saw at any angle, the degrees and inches being indicated on the table, and the saw raised and lowered by a crank.

The S. A. Woods Machine Co., of Boston, exhibit, of their standard machines, a straight inside molding machine, and a planing and matching machine; also, Gray & Wood's combination planer for planing timber and boards, the latter not in operation for want of room.

Messrs. Bentel, Margedant & Co., of Hamilton, O., have their universal wood worker in operation; also, a universal borer, beside one upright and three horizontal boring machines. The universal wood worker is furnished with boring and routing table, combined adjustable fence and bevel rest, gaining frame, molding head, &c., and is well adapted to a variety of work.

A machine deserving special mention is an automatic wood turning lathe, recently invented and designed for molding handles or any irregular turning. The stick is made to revolve but once, while the cutter head revolves 4000 per minute, thus turning a complete handle, if desired, with a square shoulder, or any other shape, then dropping it and returning for another piece. The machine is the invention of Mr. H Bickford, of Cincinnati, who claims for it a capacity of 400 handles per hour, or as many as 3000 bar-bungs per hour.

Messrs. A. T. Nichols & Co., Williamsport, Pa., exhibit a patent sand-papering machine, and the Battle Creek Machine Co., of Battle Creek, Michigan, one of Boult's carving, paneling and irregular molding machines; beside which we notice a number of fretting saws, Turbine water wheels, line extractors for steam boilers, grate bars and various other machines, all of which it would take a volume to describe.

The Fuel of the Future.

A writer in the *Evening Post* thus discusses a question which, if not demanding immediate attention, possesses a prospective interest and importance, which should not be lost sight of:

We recently called attention to a paper by one of the acknowledged authorities in coal and iron mining, in which he presented the theory that before many years a great part of the iron manufacturing business would leave interior Pennsylvania and establish itself on the great rivers nearer the seaboard, because of the early exhaustion of the present coal mines, and the necessity of opening others at points beyond Pennsylvania. According to this theory, which is supported by experience and by scientific investigation, the time is not far off when coal districts in the East and West, which are now comparatively worthless, will be the chief dependence of this country for fuel. Outside of the coal district, which lies mostly in Pennsylvania, the coal formation is nowhere comparatively of great depth, except in very limited surface areas, so far as yet discovered. The question is, therefore, becoming serious, Where will the generations to succeed us in the twentieth century obtain their fuel?

New interest is everywhere given to this question by the condition of coal mining and the coal trade in England. Although the supply there is still abundant and cheaply produced, late investigations show that it cannot last many years. Hence the panic in coal and the rise in prices, which, except temporarily, if at all, can never be as low as heretofore. At a late meeting of engineers, at Wolverhampton, England, some very significant statements bearing upon this point were made. One of the speakers, who had at first deprecated the alarm caused by the reported limit in the supply of coal, admitted that "subsequent events had proved that there was cause for alarm," and that he was "inclined to the opinion of Sir William Armstrong, that the country was nearer the end of its fuel supply than the outside world had any idea of." The condition of the counties of Stafford, Worcester and Shropshire were given to enforce this theory; at the present rate of supply the mines now worked will run out in less than twenty years, and, so far, all efforts to make new discoveries there have failed. The coal supply in the county of Salop is even now nearly exhausted, and although borings to great depth have been made in different places, and much money has been expended, no new veins have been discovered. These facts being but samples of the reports from the whole country, it is plain that England has seen its best days in cheap fuel, and the people there are justly apprehensive for the fate of their manufactories, which have depended so largely upon it for success.

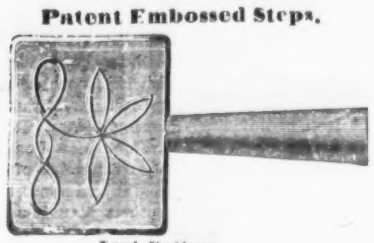
For the last twenty years coal has been so plenty and so cheap in this country, as well as in Europe, that little attention has been given to the supply of the more ancient staple in fuel, wood. Yet the price of wood has risen in most parts of this country with a rapidity much more alarming than that of coal. This has been due to the reckless manner in which the farmers and lumbermen have wasted the forests; having an abundance of land, and more than they could make useful in their lives, the future seems to have had no place in their thoughts. The result is that many even of those who own large farming estates are now obliged to purchase fuel or destroy the "second growth," which is just beginning to promise fruits for their successors. Hemlock forests are destroyed merely for the bark; the tallest pines and oaks and maples have been cut away for a few feet of "clear," while nine-tenths of the wood is left upon the ground never to be used. Hundreds of miles inland, beyond the markets, the general condition of our forests is one of waste and desolation, and in many places, when the farmer undertakes to work the land, he finds that one of the sources of income has already been exhausted, and that even for his own fuel and building material he must look elsewhere, or depend upon the slow development of the new growth. The supply of wood in Europe is no more encouraging, for although the people there are less reckless and wasteful, the dense populations of the different countries could not long be supplied with fuel from the forest.

The two countries most interested in this subject are the United States and Great Britain, because they are the most largely engaged in the development of industries dependent upon cheap fuel. England alone appears to be in great immediate danger, for the area of its coal mines is much less than that of the United States. That country looks with hope, to be sure, upon the reported discovery of rich and extensive coal fields in India; but it must be recollected that the transportation of coal for thousands of miles involves a great outlay, and at once supposes a serious demand; it can never become possible except under much higher prices than now rule in Europe or America. As to this country, it can postpone the day of short supply even after Pennsylvania shall be drained, because the Western States are sprinkled with coal beds of limited depth, and Nova Scotia could help the Eastern States for many years. But it is evident that the question of the fuel supply of the future is one which will grow in interest here, as elsewhere, as the nineteenth century approaches its close.

Contraction in Manufacture.—The financial trouble is beginning to show itself in Cincinnati in a desire on the part of a number of the manufacturers to curtail their working force, or reduce the time of employees. This is no more due to the troubles of procuring currency there than to the effect they apprehend the stringency will have on the trade of the interior. A few manufacturers have already reduced their force, and others will follow unless a change comes this week.

H. D. SMITH & CO., PLANTSVILLE, CONN.

Patent Embossed Steps.

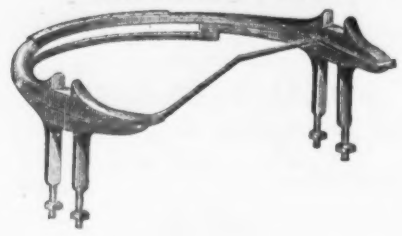


Leaf Pattern

King Bolt Yokes.

Established 1850.

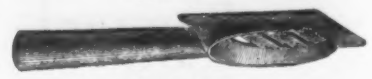
No. 6 Fifth Wheels.



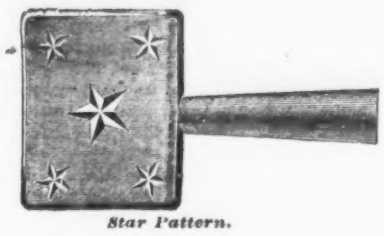
1871 Pattern Shaft Couplings.

Patent Cross Bar Steps.

Upper View.



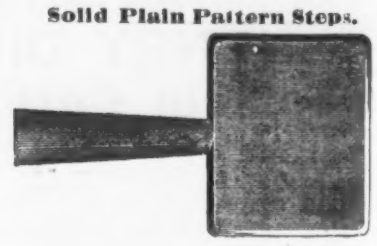
Lower View.



Star Pattern.

Smith's Improved Philadelphia Pattern Slat Irons.

Solid Plain Pattern Steps.



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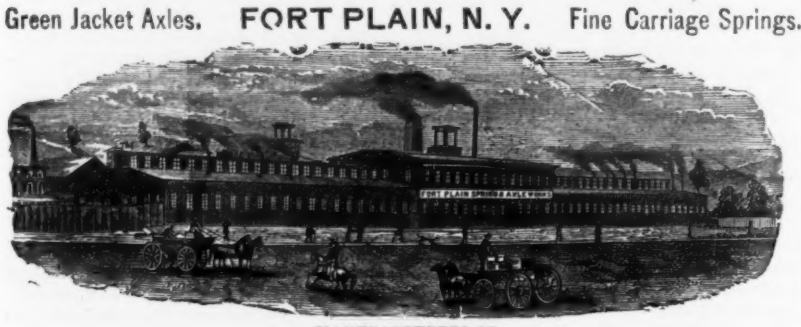

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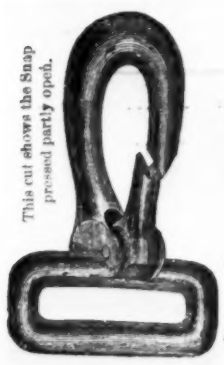

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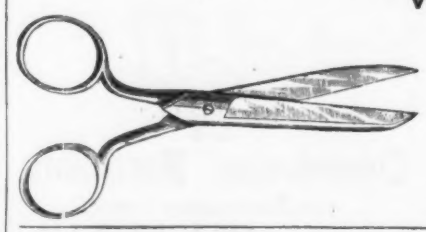

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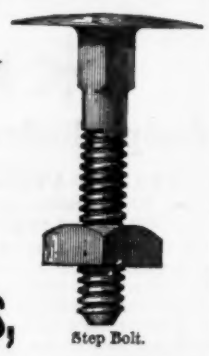

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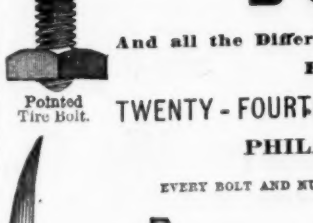

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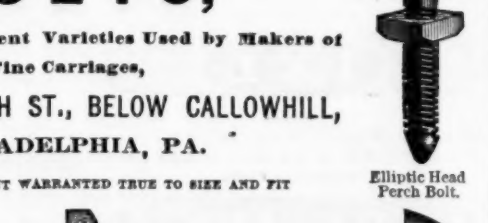

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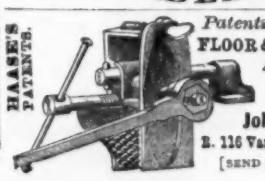
HAASE'S PATENTS.



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CORRESPONDENCE.

PHILADELPHIA, Oct. 6, 1873.

Notwithstanding the depressing effect of the financial troubles through which we have been passing, the week under review has been principally given up to parades and the like ceremonies attendant upon the dedication of the new Masonic Temple. The occasion brought numbers of strangers to the city, and gave some little stir to the retail trade, but no advantage to the general wholesale business of the week. The iron trade is almost nothing, and grave complaints are heard on all sides. Many of the furnace companies are considering the advisability of blowing out one or more furnaces, and the rolling mills are reducing wages where possible. The reduction in the number of furnaces blowing will, no doubt, be very considerable by the beginning of winter, and owing to the lessened demand for ore, wages of miners and laborers in ore banks have already been reduced. In the city manufactories there has as yet been no reduction of wages, but almost all have shortened their time, and most of them took advantage of the celebrations in the early part of the week to stop from Saturday to Wednesday. In some cases the scarcity of currency prevented the usual Saturday payment of wages, and gave rise to rumors of suspension which were unfounded. The Disston Saw Works and Steel Company was among the number inconvenienced by the scarcity of currency, and did not resume work until Wednesday, but the stoppage was to give the men the holiday referred to. The product of this works is now stated at $1,500,000 worth of saws annually, and the hardware trade is fully aware of the excellent quality of the goods. From Reading it is announced that one of the Bushong furnaces will be soon blown out, owing to the want of demand for iron. This is to be regretted, as the Bushong iron, especially for foundry grades, has been rapidly growing in favor in this market for the past two years, and is sold against the best Lehigh irons.

The Bethlehem Iron Company have reduced their ore miner's wages some fifteen cents per day, and at the Allentown Rolling Mill notice is said to have been given that all earning over two dollars per day will be reduced fifteen per cent., and those less than two dollars ten per cent. From the West the news is that some trouble is being experienced among the car shops and locomotive works, and stoppages have occurred at the Ohio Falls Car and Locomotive Works, which, employing seven hundred men, have discharged three hundred, keeping only their foundry at work. The Valley Iron Company, at Youngstown, Ohio, has been reported to have suspended, but as this works had a heavy business in rerolling for the railroads of the region in which it was located, it is presumed the stoppage will be only temporary. From St. Louis we have had rumors of the wholesale discharge of operatives in the iron works at Carondelet, which have fortunately proved untrue. Including the zinc works, there are fully 3000 men employed at Carondelet, and any stoppage would produce great suffering. There is a vast deal of Philadelphia capital invested in manufacturing enterprises in the West, and these rumors of disaster to that interest excite attention here. Despite the assurance that the panic is over, an unsettled and excitable feeling is noticeable, and fears are general that an unpleasant winter is before us. Our export trade is, however, very brisk. The Pennsylvania sailed on Thursday with a very full cargo, and the cargoes of the two next steamers to Liverpool and Antwerp have already been engaged in advance. Petroleum tonnage is also very scarce, and all the available vessels are engaged. The new ship of the American line, the Indiana, has completed her coaling, and will sail on her trial trip in a few days, and her cargo for her first outward trip is also, it is said, contracted for. The whole four steamers of this line will be running by January, and it is reported an additional number will be built. The Red Star Line, composed of four steamers, will be doubled by the building of four more, now under contract abroad, and it seems probable double this number would receive ready cargoes and rapid dispatch. But it is a well established fact that a great amount of Western produce, which would have been shipped from our Atlantic ports, and the proceeds of which would have bought American goods, has been diverted to the St. Lawrence, and the benefit will inure to Canadian buyers and the market for British goods.

SCIENTIFIC DEPARTMENT OF LAFAYETTE COLLEGE.

The new building to be used for the scientific department of Lafayette College, which has been erected at a cost of $250,000, all of which is the gift of Mr. Arlo Pardee, in addition to his former liberal contributions to this institution, has been completed, and will be dedicated on the 21st inst. The building is five stories in hight in the center, and four stories in the wings, with a front to the center building of fifty-three feet and a depth of eighty-six feet, while the wings are sixty-one by thirty-one feet, the entire frontage being two hundred and sixty-six feet. But it is to the importance of the interior that the attention of iron men will be attracted. The whole of the first floor will be devoted to the study of mining and metallurgy, the second containing the geological and mineralogical cabinets, lecture and reading rooms, &c. The third floor will be given to the engineers, the right wing to mining engineers, and the left to civil engineers, with rooms for models, collections, etc. The fourth floor is arranged for the chemists, with rooms for technical collections, and a wing devoted to quantitative and qualitative analyses and laboratories. The fifth floor will be devoted to laboratories for original researches. Everything which the best institutes of Europe could offer has been adopted in the arrangement of this building, and liberal provision has been made in all the departments of instruction for the most thorough teaching and for the prosecution of original researches. Independently of the very great advantage to the interests of our country which are to be derived from such a noble institution, it is certainly a matter of pride that the donor of such a contribution to practical science should belong to that much abused class of "Pennsylvania monopolists." Mr. Pardee has been for years closely connected with the coal and iron interests of Eastern Pennsylvania, and this last of the many liberal gifts he has made to the cause of scientific education, shows that the policy which enabled the successful prosecution of our industries bears good fruit for the educational future, as well as in the present material prosperity of our people. Prof. R. H. Thurston, of the Stevens Institute, of Hoboken, writes from Europe that our schools at home now supply almost every want of the student of metallurgy or mining engineering, and with the establishment of such new departments as that now added to Lafayette College, we can offer our youth greater advantages even than those of Europe. Nothing can more assuredly determine the successful future of the iron trade in this country than the education of an active and energetic youth in the thoroughly scientific conduct of it; nor will any profession offer greater certainty of remunerative and honorable employment than that grounded upon the course of study here offered.

THE READING RAILROAD COMPANY.

The latest street rumor about this company, always the subject of discussion, is the purchase of 500 acres river front by that corporation at Chester. During the summer this company leased from the Philadelphia, Wilmington & Baltimore Railroad Co. what was known as the old road along the Delaware, the latter company having constructed a new and shorter route between Philadelphia and Chester. This old road the Reading company uses for an outlet for coal to the river below the ice blockade, and, rumor says, proposes the erection of a great foreign coal shipping port, with furnaces and an iron plant of extra large proportions. Should this prove true an additional impetus will be given to the rapidly growing industries of Chester. *Per contra*, a story is afloat that the irrepressible Col. Scott, of the Pennsylvania Railroad Company, now in Europe, has obtained a control of the Reading Railroad through English owners of the stock, and that it will be the next great absorption of the Pennsylvania Company, and the coal of the Schuylkill and Lehigh be transported as freely West as East. The ability and shrewdness of the President of the Reading Railroad Company, however, argues against the truth of the latter story, and just now other individuals beside Col. Scott have found railroads heavy property to carry.

Notwithstanding our business panic, there is a steady and growing disposition on the part of English capitalists to invest in our iron ore lands. Several parties are now here investigating ore lands for purchase, and letters have been received from England during the week, inviting offers of good ore properties for sale. From Alabama I have received reliable intelligence that a coal has been found in the neighborhood of an established iron works, similar to the block coal of Indiana, and which will make iron without coking. This, if borne out in practice, gives an additional value to the rich and abundant ores of that State, and will, undoubtedly, rapidly advance the industry in that region. The new inventions connected with the iron trade are thoroughly represented in your Patent Office record, but an invention of importance here, I have not seen noted. This is a patent for covering ironwork, both exposed to the air or water. It is said not to be affected by salt or fresh water, and very durable. It has already stood a test of two years on an iron ship in steady service, and a number of vessels are now being coated with it. Although trade is dull the interest of our manufacturers in matters pertaining to progress is unabated, and every novelty of merit finds capital to take hold of it.

THE PETROLEUM TRADE.

The importance of this trade to Philadelphia may be appreciated by the statement that there were exported from this port during one week recently 1,484,300 gallons of refined, and 230,600 gallons of crude petroleum, while the receipts covered 26,213 bbls. of crude, and 27,500 bbls. of refined. The production of petroleum has of late been greatly increased by the discovery of new oil territory in Butler county, Pennsylvania, and further by the discovery that the fourth sand rock, hitherto believed to be *ultima thule* in well boring, really covers another and probably equally great supply. All this of course greatly increases the supply, taxing the transportation facilities to their utmost, and vastly reducing the cost of oil. At present prices petroleum offers great inducements as a fuel in place of coal, and it is not surprising that the efforts of inventors should be turned in this direction. Hitherto the inventions in this line have not been successful, at least commercially. In the summer of 1872 the writer saw an apparatus for using petroleum as fuel for puddling furnaces in operation at the La Clide Mills, St. Louis and the superintendent of the mill then expressed the opinion that the obstacles to entire success with it were only that the parties in charge of the matter were ignorant of the management of the puddling furnace. We have never succeeded thoroughly in burning liquid fuel for locomotive driving, but in both France and Belgium it has been accomplished. The advantages to be gained are patent, while the present and probably the future low cost of the material offers every inducement.

The Philadelphia and Baltimore Railroad Company has lately been testing, at the company's shops at Lamokin, Pa., 16 miles from this city, an invention of Mr. Kendrick, to use crude petroleum as a fuel for stationary engines. The vaporizing apparatus consists of a burner, an iron cylinder in which steam is superheated, and another iron cylinder in which the superheated steam is brought in contact with the gas. The burner and cylinders are first heated by burning a small quantity of benzine beneath them, after which the steam and crude oil are turned on. There appears to be no difficulty in burning the crude oil thus, nor are the cylinders coated with carbon or any residuum. The cost is itemized as follows: seven gallons of crude oil, at a cost of forty cents per hour, against seventy or eighty cents per hour when coal is used. The inventor further claims to be able to make, by this process, an illuminating gas at a cost of 60 cents per 1000 feet, with oil at 8 cents per gallon. That this would seem practicable, appears from the description of the new English patent of Mr. Ruck, for the manufacture of gas from steam and petroleum, which is well explained in a late number of the *British Journal of Gas Lighting*. Here superheated steam is passed over coke and scrap iron in a series of retorts, and thence, after purification by oxide of iron, into a saturator containing refined petroleum or naphtha of ·680 specific gravity. The cost of this gas is not to exceed 1 6. per 100 feet, with coke at 20/ and oil at 8d, or 16 cents, gold, per gallon. Such being the case abroad, it would appear that Mr. Kendrick's figures here are within the possibilities, and the more so since a contractor to supply gas to the new House of Correction, in this city, offers to provide a gas not exceeding in cost $1 per 1000 feet, by a new process. To render petroleum sufficiently cheap to compete with coal as a fuel in iron works, the cost of transportation must be greatly reduced, and this subject is also under process of improvement. An able engineer, Mr. G. W. Platt, who has successfully superintended the introduction of the Holley system of water works, advances a scheme which he demonstrates as thoroughly practicable, for a pipe line from Titusville to Philadelphia, distance 260 miles. The plan proposes a six inch cast iron pipe to be laid in an air line between the two points, with an allowance of 40 miles of pipe for undulations, or in all 300 miles. This pipe would hold 37,000 barrels of oil, and would present no greater difficulty in passing through it than is found with water through our city mains. Pumping stations, at a distance of 5 miles apart, in the 40 miles between Titusville and the summit, will be provided, and reservoirs. The scheme proposes to deliver 23,000 barrels every twenty-four hours, at a cost of ten cents per barrel. The total cost would be $4,406,150, and expenses of running, with interest, $412,717 per annum, which, with a charge of 50 cents per barrel, would give an immense profit, while it is said the loss from waste in transport would not be as great as now in barrels or tank cars. This would not only reduce the price of petroleum at the seaboard sufficiently for the purposes of fuel given a successful process for burning it, but would greatly relieve the railroads, and permit greater amounts of Western produce to be carried. The importance of the subject insures attention from practical men, and the enterprise is likely to be carried out. The process for burning oil, referred to above, is being applied to locomotives on the Philadelphia and Baltimore Railroad, and will be thoroughly tested in a short time, when the result will be here announced.

PHILADELPHIA IRON IMPORTS.

The imports of iron and steel, and manufactures thereof, into this port from abroad during the month of August last, show a very marked falling off over those of the like period of 1872, and are as follows:

Pig Iron,	4488 tons, value	$174,512 00
Bar "	238¾ " "	18,700 00
Old "	2453 " "	89,370 00
Hardware, value		681 00
Anchors and Chains,	13 tons, value	2,428 00
Machinery, value		5,359 00
Steel, value		14,968 00
Cutlery, value		5,031 00
Files, value		5,914 00
Other manufactures of Iron and Steel		139,284 00
Lead, Pig,	498,593 lbs., value	23,651 00
Tin, Plate,	13,702 cwt., value	122,394 00

The importation of tin plate direct has become very large since the establishment of the new steamship lines, the house of N. & G. Taylor & Co. receiving large shipments by each vessel, the receipts by the Pennsylvania during the week having been 2187 boxes to this house alone.

Rhenish Coal and Iron.

Few more remarkable instances could be cited of the rapid development of mineral wealth than that afforded by the coal and iron trade of the Rhenish provinces. In sixteen years an advance has been achieved in the production of coal equal to that made—even by busy Belgium—in thirty-five years. In 1855 the total yield of the coal mines of Westphalia, exclusive of those on the left bank of the Rhine, reached the very moderate quantity of 3,000,000 tons, while, in 1871, the output reached 13,000,000 tons; and even now the mineral resources of the country are by no means adequately developed. The large expansion in the yield of coal, between 1855 and 1870, was, moreover, accompanied by peculiar phenomena. More coal was produced, and an immense increase in the number of hands took place, while the area of distribution, and the price, underwent a singular diminution. Rich seams of steam, gas, and coking coal were discovered, the manufacturing power of the country was fostered by political consolidation and a liberal commercial policy, the restraints upon the migration of labor were abolished, and the coal royalty was reduced. In every respect, excepting only transit—which proved lamentably insufficient for the rapidly increasing demand—the country advanced rapidly, and the manufacturers of the Rhine, ambitious both to supply the home demand and to compete in foreign markets, plunged into a series of colossal enterprises. At last the demand outran the supply, and in 1870 coal advanced from 6/, the price of 1869, to 9/ per ton. Every effort had been made by the coal owners to meet the growing demand for home consumption and export, but many obstacles prevented them from reaping the rich harvest before them. The mining population was not sufficiently large to supply labor, and the railway accommodation proved utterly inadequate to the occasion. The existing Rhenish lines had almost a monopoly of carriage, while new lines were slowly made and partially opened, and traffic rates remained unchanged "in order to keep down, if possible, the strain upon the companies' rolling stock." As might have been expected, miners asked for and received repeated advances in wages, until their continued demands culminated in a strike. To crown the difficulties of the situation, war broke out in 1870. Railway carrying power was at once concentrated on military transport, while the drain of labor at the collieries contributed to reduce the output. Owing to these causes it actually occurred that English coals were imported into Cologne for the manufacture of gas.

Toward the conclusion of the war coal was in such strong demand as to tax the powers of colleries and railways severely. Great efforts were made, and although labor was scarce and transport short, the output and sale of coal increased, although not in the proportion in which they might have increased had sufficient labor and transit been attainable. Labor, indeed, beat transit, and large accumulations of coal were formed at the pit mouths, while smelting and rolling works actually stood still for want of fuel. In May, 1872, trade was buoyant and wages were rising, when this happy state of things received a check from the action of the Essen miners, who struck on the 18th of June to the number of some 15,000 or 20,000 men. This strike was based upon the high market price of coal, and was resisted by the masters on the ground that they were working by contract and not for stock. For six weeks, during which they were losing £3000 per day, the men held out, and then suddenly returned to work. An advance of wages—though not grasped at the moment—was ultimately secured by the men on account of the high prices brought about by the strike itself.

By an operation of the law of panics not unknown in this country, coal went up in price immediately on the declaration of the strike. Not knowing how long the strike might last, and dreading an interruption of their business, manufacturers would not be denied, and determined on replenishing their stocks at any price. Coal advanced to 13/ and 14/6 per ton, and was eagerly bought up at those prices. In July the demand became more urgent, and on the railways failing to cope with the increased coal traffic, prices continued to rise until 17/ and 19/ per ton were quoted. As prices rose wages increased till the wages of hewers in the Anna mine reached 4/5 per shift in December last, showing an advance of about 50 per cent. on the wages of 1869. On the labor of the men the advance of wages produced the same effect on German as on English miners. The output per man diminished as wages increased. In 1866 the annual production of coal per man in the Rhenish provinces was 227, and in 1871 was 215 tons, while in Dortmund it took 22·38 per cent. more men to achieve an increased output of 7¼ per cent.

So rapid is the development of Rhenish industry, that although in 1872 little less than 14,500,000 tons of coal were produced from the Westphalian mines, the export up and down the Rhine but little exceeds 1,000,000 tons per annum. So great are the requirements of the manufacturers, that, in spite of the opening offered for export by the high prices obtained in England, the increase in 1872 was barely perceptible. The Germans are quite equal to consuming their own coal, and, undeterred by high prices, buy with eagerness and resolution.

But little inferior in rapidity of development to the coal trade, the production of German iron well deserves more than a passing notice. From 1,000,000 tons in 1864 the quantity of iron ores raised in the districts of Dortmund and Bonn rose in 1871 to 2,125,000 tons, or rather more than one-eighth of the total amount of iron raised in Great Britain during that year. In 1855 the blast furnaces in the same district numbered 133, producing 216,583 tons of pig iron, while in 1871 a slightly increased number of furnaces (146) produced 882,373 tons. Much of the iron ore is found in hilly districts, far from railways and good roads, thus the cheapness of labor is more than counterbalanced by the cost of carriage. When the ore is brought to a railway, many difficulties have still to be overcome. The low rate of speed maintained upon these lines, the want of sufficient rolling stock, the absence of running powers for goods over the territory of more than one line, the want of through trains and through rates, combine, with high charges for transport, to throw obstacles in the way of iron production.

So great is the cost of transport that only the very richest ores pay for carriage to the coal districts. Siegen and Essen—well-known names—afford a striking example of the disadvantages of costly transport. The district around Siegen contains fifty-two iron mines, yielding about 250,000 tons of ore per annum, and is distant from Essen about seventy miles by rail. Specular hematite worth 22/ per ton at Siegen, costs 25/6 per ton at Essen—the carriage costing 3/6 per ton.

Struggling bravely against all the disadvantages of dear transport, dear coal, and dear labor, the iron masters of the Rhine have toiled through some very hard times, and immense sums have been lost in the effort to produce iron at proportionate prices to those ruling in England and Belgium. Still, the trade has increased in importance, and if not killed off by the introduction of English iron, duty free, will, with better means of transport, bid fair to compete vigorously in the markets of the world. Railway transport having proved both inadequate and costly, it is now proposed to cut a ship canal between Dortmund and the Rhine, below Ruhrort, a project which, if carried out and extended to Minden, would open an important communication between the Weser and the Rhine, and enable the coal masters of Rhineland to deliver their produce cheaply in Bremen.

Cheap Motors.

A history of the attempts to find a more economical power than steam, were it possible to write it, would be one of heart-rending failures, of hopes dashed to the ground, of wild expectations cooled by unexpected results. When Watt made his great improvement in the then existing steam engine, of placing the cylinder in one position and the condenser in another, or, in popular words, making a hot portion and a cold portion to his engine, the work he had commenced was far from completion. During the years of after labor he so perfected and refined, if the expression can be used, every portion of the apparatus, that the engine of the present day is in principle much as it came from his hands, the modern improvements in almost all cases being confined to minor details, or made possible by the improved means of working metals. It is but natural that inventive talent should, at these stages, have endeavored to devise a better and cheaper motor than steam, and to create or develop power by combining chemical or mechanical discoveries in such a manner that an apparatus capable of superseding the steam engine should be the result. Up to the present time, however, no one has yet succeeded in solving this problem. Prominent among numberless attempts, the hot air engine, invented by John Ericsson many years ago, deserves the first notice. This eminent engineer spent time and money in the perfecting of his invention. The principle was simply this: Atmospheric air was heated and then allowed to pass into a cylinder having a moving piston. Heating the air caused it to expand, and consequently to push the piston toward one end of the cylinder. With wonderful skill and ingenuity the inventor worked up the mechanical details of his engine, but, despite all this, it must be recorded as a failure in one sense of the word. The small increase in volume of the air due to the increased temperature, made it absolutely necessary to use large cylinders for comparatively small powers, and the rest of the mechanism being on much the same scale, the result was that the engine for every horse-power of work developed was many times heavier than a steam engine of corresponding power. Many other difficulties presented themselves when engines of large powers were made, and the result is that to-day this style of motor is alone used in situations where room is of no consequence, where skilled labor cannot be had, and where small powers are alone required. On Mr. Ericsson's idea numberless lesser lights have, as experience gave them knowledge, made improvements, so that now we have a number of competing designs in hot air engines, each one possessing some small advantage over the others, but none really capable of steadily giving over five or six horse-power of work.

Another invention, or rather class of inventions, known as gas engines, have had some small reputation. Common burning gas, mixed with atmospheric air in the proper proportions, makes a most explosive compound; this on being let into a cylinder was ignited by the sparks from an electric machine, or else by a separate flame, an explosion was the result, which, for the moment, generated considerable pressure, forcing the piston in one direction or the other. This, though good in theory, came to grief because of many practical defects. The sudden explosion was too much of a shock, the great heat generated in the cylinder was prejudicial to all packing, and required a constant supply of cold water to cool the outside; this, combining with other causes, gradually pushed this design of engine out of the market. A new gas engine has lately been constructed which utilizes gradually the increase of volume due to combustion, the gas being fed from a reservoir of gas and air at a considerable pressure. This invention has not as yet been tested by long use, but it has many points of superiority, though it requires that the cylinder should also be kept cool by water. Its economy is very great, 40 feet of common gas furnishing one horse-power per hour. Engines have been constructed using gun powder, or other explosive substances, behind a moving piston, but all such attempts, though presenting alluring features to the sanguine inventors, have invariably resulted in practically nothing. One inventor made attempts to produce power by burning the oxygen out of air contained in a cylinder, the result being a partial vacuum. The many attempts to devise a cheap electric motor have been, each and all, such signal failures, that it would be disheartening to recount them. It is useless to proceed further in the construction of electric motors till we find a source of electricity, cheap, abundant, and compact. Numberless experiments have been tried with various substances whose boiling point is less than water, but they have been alike unsuccessful. The property possessed by ammoniacal gas of condensing, when brought into contact with cool water, and again freeing itself on the application of heat, has been extensively experimented upon, but with small success. The pages of the Patent Office Reports tell a sad story of misapplied effort in this direction, but it is to be hoped that some good will ultimately result from these now useless inventions. What may be accomplished in the future none can tell, but for the present it would seem that efforts to provide more economical motive power give most promise of success when directed to the improvement of the steam engine.

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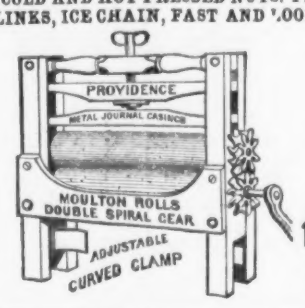

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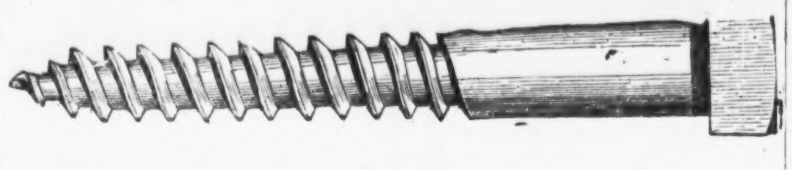

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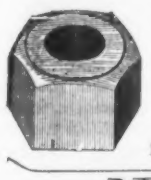

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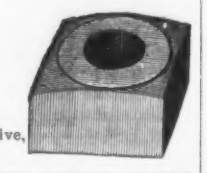

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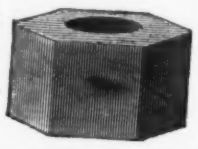

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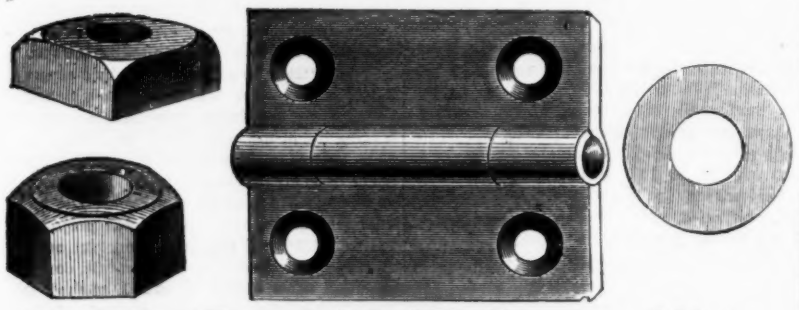

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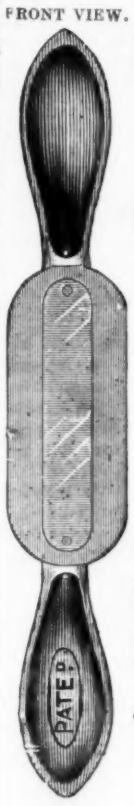

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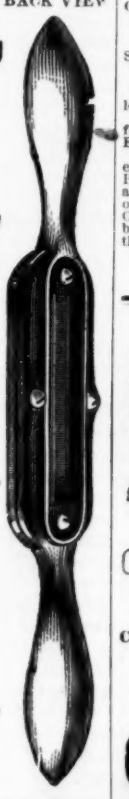

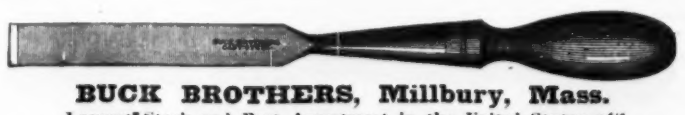

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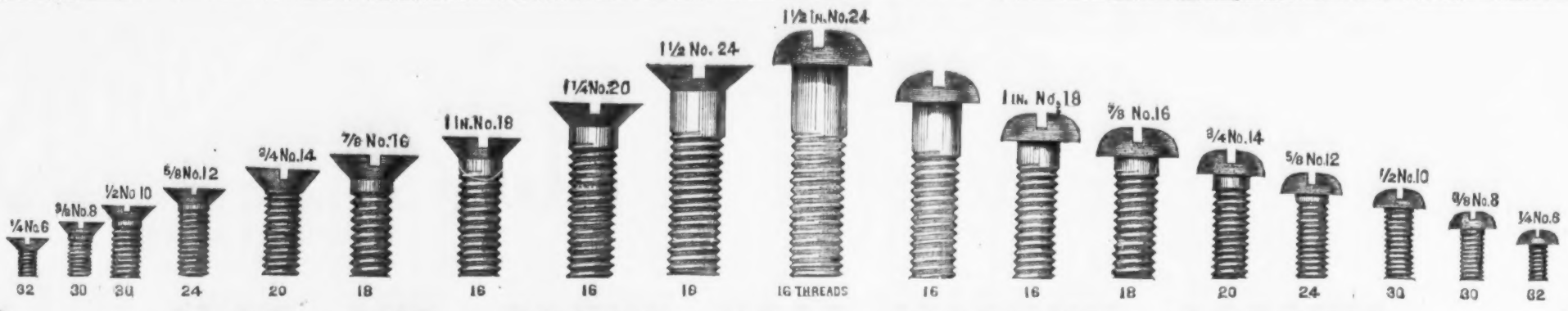

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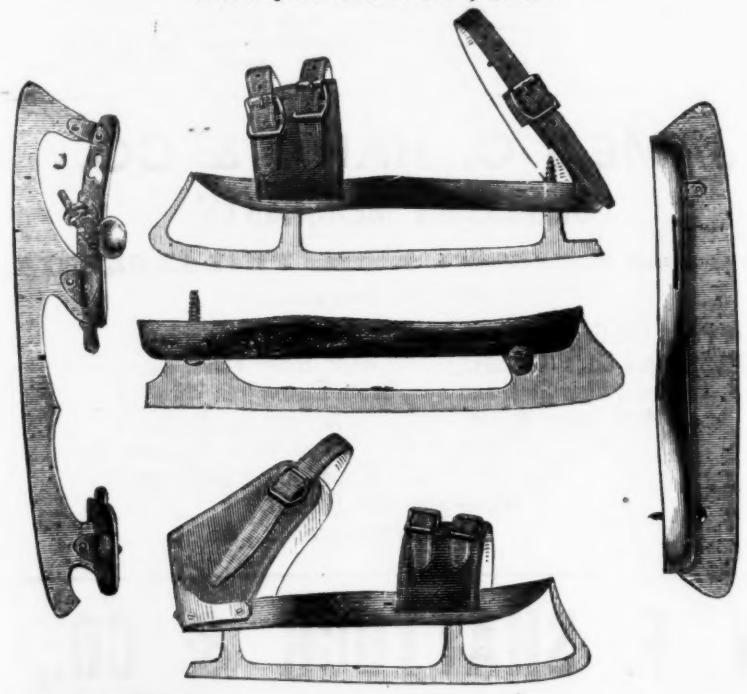

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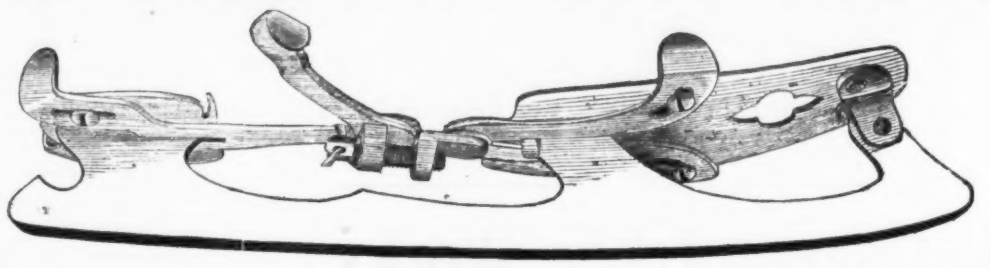

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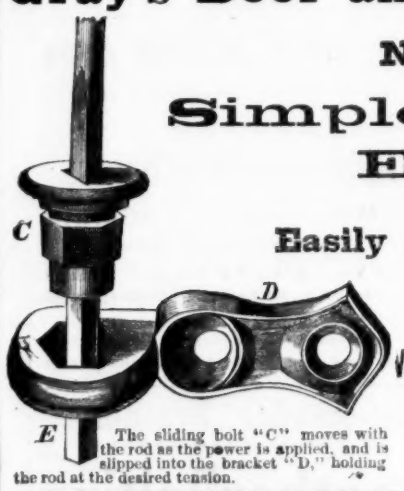

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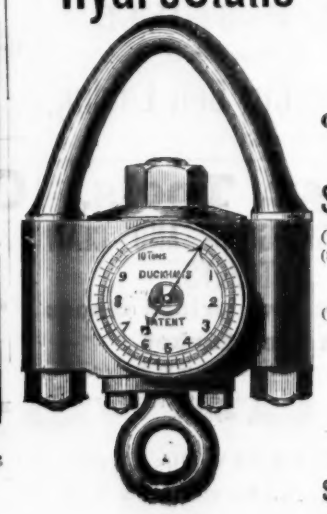

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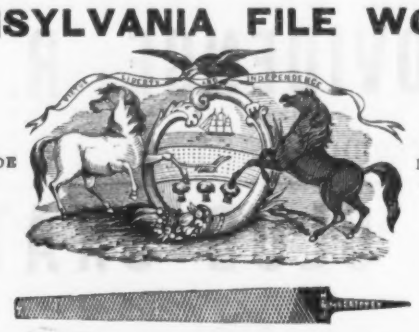

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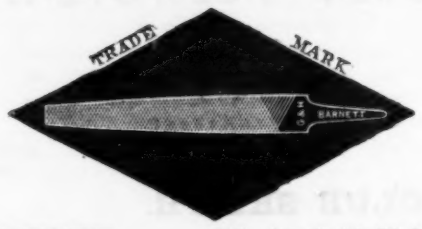

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The New Cliff Furnace.

The new furnace on Foster Lake, Michigan, building for the Cliff Iron Co., of Negaunee, is rapidly approaching completion. The stack is of stone, obtained in the vicinity, and so hard that it is scarcely surpassed by cast iron. When struck with a sledge it responds with a metallic ring. The dimensions of the stack are 30 by 34 feet at the base, 48 feet high, with boshes 9½ feet. It is to be finished with close top, compound tuyers on the sides, and single tuyers in the rear.

The casting house is 44 by 78 feet; frame, on stone base, iron roof. The engine and boiler houses, each 38 by 52 feet; frame, stone base, under one roof of iron. The stock house, 36 by 113 feet, on a bank on a level with the top of the furnace. This is also roofed with iron. The hot blast, of brick, located on the top of the furnace stack. It is supplied with three arches of pipes, thirty pipes in all, the nest being 9 feet high, in a combustion chamber 12 by 12 feet, and gas chambers below running parallel with the range of the arches.

There are two boilers, each 26 feet long and 5 feet in diameter, with four 8-inch return flues. The blowing engine is one of Mackintosh, Hemphill & Co.'s vertical, 5 by 5 feet blast cylinder, and 24 inch steam cylinder. The Knowles pump—of which there are a number—has been adopted for general use. An independent engine, in a building adjoining the stock house, away from the dust, is used to operate a Blake crusher.

The buildings occupy a T form, the stock house running from the bank, as in the column of the letter, while the casting house forms the left and the engine and boiler house the right wing of the group. The hoist is one of the best we know of, being a railway track in the rear of and on a level with the top of the furnace—a switch from the Mineral Branch of the Chicago and Northwestern Road. The main branch passes beneath the stock house, and a switch will be laid down to carry the iron directly from the casting house, so that the conveniences for handling stock to feed the furnace, supply fuel for the boilers when needed, and for taking away the iron, could not be better, and will not require any auxiliary cars or locomotives for special use.

The work is well toward completion, and the furnace can go into blast before cold weather sets in. Eighteen coal kilns are now at work preparing fuel, and six more are in the course of construction. A great deal of the iron work was done at the Cliff Company's foundry and machine shop, Negaunee, under the charge of furnace mechanic, Mr. O'Neil, and the general supervision of construction has been in charge of Mr. Houston, the assistant superintendent of the company's furnaces.

Railroading in the White Mountains.

The White Mountain Railway is about three miles long, with grades as steep as two thousand feet to the mile. The following adventure on it occurred on the 2d inst., as described by a correspondent of the Springfield *Republican*:

And now we begin the fearful ascent of Jacob's Ladder. The little car, brought nearer to a perpendicular position by the acute inclination of the road, seems ready to fall backward upon the engine and hurl itself into the abyss below. Poised in mid-air, thousands of feet from the bottom of the mountain, in the very clouds themselves, a storm raging without, covered with a perfect sea of darkness, our only shelter a frail bark, which, for all we knew, the slightest mishap may cause to be dashed into atoms on the rock below, and who will wonder that the stoutest hearts feel just a little of fear? But onward we went, steadily onward and upward, when, just as we were congratulating ourselves that the worst of the journey must be over, there came, without warning or premonition, a loud crash like a thunderbolt shot from a cloudless sky, so sudden and unexpected was it. Then there was an instantaneous stoppage of machinery, a palpable or terrifying lifting, or upward movement of the car, accompanied by a violent surge down hill, as through striving to break away and leap from the tracks into the depths below, and then a sudden settling to place again, and then—all was still! Was there a panic? No. Did anybody scream, or faint, or try to jump overboard? No, far from it. It was all so sudden, so appalling, so overpowering, that the effect was quite the reverse.

The main eccentric shaft of the engine was broken short off, deranging all the machinery, and rendering further progress by rail, either up or down the mountain, utterly impossible. Of course there was a hurried and anxious consultation as to what had better be done, but there was one thing settled on the instant, and that was to leave the car, whatsoever might come next. Nothing on earth could have kept us there any longer. It was raining in torrents, blowing a gale, and blacker than Egyptian darkness, but that was nothing to the dread uncertainty of what possibly might happen if we remained where we were, and so, gathering up such light baggage as was at hand, out we went into the rain, into the gale, into the night, and clung to the timbers, to the car, and whatever else could be laid hold of, as best we could, like so many drowning rats.

When lights were brought and our position determined, it was found that the accident had occurred within a few feet of the upper end of the first section of the ladder, where the great trestle work tapers away, and rests upon a sort of abutment, formed by the projecting ledge, very much as a bridge rests upon its embankments at either end. The road was just as steep here as elsewhere, but our hight above the rocks was much less, being, so to speak, nearer the shore, which rendered landing possible; whereas, had the disaster occurred a few rods either below or above, we must have remained all night in the car, or clinging to the trestle work. As it was, we reached the ground with no little difficulty and danger. Once landed, it was one of three things: To remain where we were, or go down the mountain to the station, or to go up the mountain to the Summit House. The first proposition meant being chilled through and through, and perishing without exertion; and of the other two we chose the last. And so we started. Meantime the brakeman descended to the station at Marshfield on a "slide board" at the risk of his life, and telegraphed to the Summit House for guides and lanterns to be sent to conduct us up the mountain. But who shall describe the narrow escapes from pit falls and precipices, the hights scaled, the depths explored, as chilled and blinded by the driving storm, we clambered, torn and bleeding, over the jagged rocks, up the steep sides of the bleak mountain? Or, how strong men broke down and gave out in utter despair; how weak and sickly women had to be almost carried along by main strength; how others repeatedly fainted and fell, overcome by the terrible exposure and exertion, until life itself seemed gone out forever?

All we could do was to keep as nearly as possible to the general bearing of the railroad, and push forward over rocks piled literally mountains high. Having been lost for some time, we finally struck the railroad, and followed it up to a small shanty near the top of the mountain, occupied by the workmen on the road, where we arrived entirely exhausted and worn out. The guides sent down to find us, after having hunted for several hours in vain, had taken shelter here from the storm to await events. We were then conducted in safety to the Summit House, where we had a memorable reception.

An hour ago our little company were gathered together for the last time; and, as we stood around the piano in the great parlor and sang "Praise God, from whom all blessings flow," the words had a deeper significance than ever before.

The German "Infant."

The German 700 lb. "Infant," which is 30½ centimetres in diameter, has, according to the *Borsen Zeitung*, of Berlin, "already fired 230 shots, five of them with the maximum charge of 130 lb., without sustaining the slightest injury, either to the barrel or the carriage, while the new English 600 (? 700) pounder, the 'Woolwich Infant,' which is thought so much of in England, was strained in the barrel after the fourth shot. Though 230 discharges are very few in comparison with the requirements of war, yet it is noteworthy that no English gun of similar calbre has sustained anything like this number of rounds, and that the German "Infant" has gone through this ordeal "without sustaining the slightest injury to the barrel," whereas the "Woolwich Infant" had "the driving edges of the grooves slightly worn," and local scoring begun after only six rounds from 11·6 inch bore. After 35 discharges, the erosions, enlargements, and groove marks were removed by boring the "Woolwich Infant" up to a 12 inch barrel; but at the 12th round the renewed barrel showed enlargements where the rear studs come first into driving bearing; at the 33rd round four grooves were found cracked at the same spot, and at the 38th round the "Infant" was found *hors de combat* from an accumulation of injuries at the point where the rear stud comes into driving bearing. Contrasted with this limited endurance, the Germans have some right to crow over the "The 'Woolwich Infant,' which is thought so much of in England," seeing that their 700 pounder "Infant" "has already fired 230 shots, five of them with the maximum charge of 130 lb., without sustaining the slightest injury to the barrel." The second "Woolwich Infant" has been returned from Shoeburyness to the Royal Gun Factories, without firing even so many heavy charges as its precursor, and is not likely to be allowed to be injured by rapid discharges, even if it fire any more projectiles with heavy charges at all. It is also noteworthy that, whereas the "Woolwich Infant" is reduced to a maximum charge of 110 lb. P. powder, the "German Infant" consumes 130 lb. powder. We are not told by the *Borsen Zeitung* what initial velocity is produced by this 130 lb. charge, but if the increment of velocity be at all proportioned to the increase of charge, the battering power must be greatly in excess of the English "Infant," though inferior to that of the French "Infant," which consumes 137 lb. of powder behind an 820 lb. shot. Thus the rifling system, which "has decidedly the lowest velocities," with similar charges, has necessarily decidedly the smallest maximum powder charges, and, consequently, "decidedly the least penetration."

Superheated Steam and Coal Tar in a Puddling Furnace.—The Marquette *Mining Journal* publishes the following description of an experiment lately conducted at the Wyandotte Mills, by Mr. Merrimen, which is said to have been quite successful: The plan embraces the use of all the heat which can be obtained from dry hydrogen and oxygen as evolved from superheated steam, and carbon as evolved from coal tar, in conjunction with the use of atmospheric air.

An ordinary puddling or heating furnace has its fire space banked up with brick, or any other suitable material, and on the top of the bank near the level of the bridge wall the gases are introduced and consumed in the following manner:

A tank containing coal tar stands above the furnace at a convenient distance. A pipe leads from this tank to the opening on a level with the bridge, now the floor of the combustion chamber. Through this pipe the tar is allowed to drip slowly, and is caught by a jet of superheated steam that issues from a sixteenth or eighteenth inch nozzle, as the case may require, impinging against it, the force of the jet of steam carrying a certain amount of atmospheric air with it, and the whole igniting and burning with a succession of explosions and a fury which it would seem could not be surpassed by the rattling of a score of muskets. The steam is heated by passing from the boiler through a coil in the exit flue of the furnace, the pipe being kept at a red heat, and the steam being absolutely red hot as it impinges against the tar, thus igniting the latter, and, with the atmospheric air carried in by the draught created, combining elements of combustion which create an intense heat and flame which will bring pig iron to a boiling point in an incredibly short time.

The steam is superheated to a temperature of about 1800 degrees, and is delivered against the tar at a pressure of about 60 pounds to the inch. The volume of flame completely fills the puddling chamber, in a mass of white heat, and the iron is attacked and melted without being charged with a particle of foreign substance as in the case with a flame evolved from the use of granulated or fixed fuels. The combustion is complete, every particle of the gases being consumed. The iron is made close grained and firm and tenacious, and fractures like the best of steel.

The expense of fuel by this process is the expense of the coal tar, which, at three dollars per barrel, aggregates 65 cents per ton for puddling iron or smelting pig iron.

Boiler Tests and Plates.

The Pittsburgh *Commercial* of the 1st instant, says: General D. D. Smith, general inspector of boilers, arrived in this city yesterday, from Washington, to see how the work is progressing in regard to the forthcoming boiler tests. Another object of General Smith's visit here is to make arrangements for a strict enforcement of the law providing for an inspection of all iron and steel plates used in the manufacture of boilers. He had been informed that certain manufacturers here are without the necessary machines for testing and stamping plates, and that they have been using and selling such plates without having had them submitted to the tests and stamped as required by law. With a view of informing himself thoroughly on these points, and for the purpose of having the law rigidly enforced, he visited several of the boiler and boiler-plate factories, and issued instructions to Mr. Armstrong, the inspector, as to a strict performance of his duties in all cases. He announces that Pittsburgh will be particularly watched in this matter, and the efficiency of inspecting boiler-plates be thoroughly tried. All violators of the law that may be detected will be promptly followed by the fixed penalties.

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An importer now doing business in this city, who has an experience of over 20 years, wishes to make an arrangement with some out of town house, either in any of the adjacent cities or the West, to act as their agent, and to give his whole time to the purchases and shipments of goods bought here, and the passing of goods imported through custom house. Compensation a stated salary, or a commission, as may be decided upon. Best of references given.

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Fare each way, 20c. Excursion Tickets, 35c.

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42, PINE ST., N. Y.

Translations and Condensations.

The undersigned, commercial Editor of *El Cronista* the Spanish Government paper in this city, and Foreign Editor and Translator of the *Daily Bulletin*, has made it a specialty for years past to translate industrial matter, with the strictest adherence to the technical wording, from and into English, German, Spanish and French, for manufacturers, patentees and others, and begs to be recommended to the iron masters and trade in that capacity.

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Wanted a founder for a charcoal furnace in the State of Virginia. Must be accustomed to making car wheel iron from brown hematite ores, with warm blast. Address, stating price and references,

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The best medium for advertising American Machinery to the attention of European capitalists.

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NEW YORK, July 1, 1873.

THE ATTENTION OF MANUFACTURERS AND business men is called to the natural advantages of Bristol, Bucks County, Pennsylvania, for a manufacturing site, situate on the River Delaware, with a river front of over one mile, navigable for vessels drawing 15 feet water, 18 miles from Philadelphia, on the line of the New Jersey Division, Pennsylvania Railroad, between Philadelphia and New York, and at the terminus of the Delaware Division of the Lehigh Canal, by which coal and iron are brought to our town cheaper than at any other point between New York and Philadelphia.

Bristol is noted as being a very healthy place, with cheap homes and low rents, good public and private schools, six churches of different denominations, and several manufacturing establishments already established. It contains a population of over 5000, and is constantly increasing in size and population.

Believing that Bristol possesses advantages that few other towns possess, and that the attention of manufacturers need only be diverted in this direction, the Burgess and Council have enacted the following ordinance, viz.:

Be it ordained and enacted, by the Burgess and Council of the borough of Bristol, and it is hereby ordained and enacted by the authority of the same, That all manufactories which shall be erected within the borough of Bristol, during the period of ten years from and after the passage of this ordinance, shall for and during said period be exempted from the payment of borough tax.

Enacted into an ordinance at the Council Chamber, this fourteenth day of July, A. D. 1873.

CHARLES E. SCOTT, Burgess.
Attest: J. WESLEY WRIGHT, Clerk.
BRISTOL, Pa., July 21, 1873.

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Our only authorized Agents to collect money for anything connected with our publications will invariably be provided with a letter of authority, specifying the particular object for which it is given, and bearing our official seal, and signed by the Manager.

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The Iron Age.

New York, Thursday, October 9, 1873.

DAVID WILLIAMS . . . Publisher and Proprietor.
JAMES C. BAYLES . . . . Editor.
JOHN S. KING . . . . Business Manager.

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City Subscribers will confer a favor upon the Publisher, by reporting at this office any delinquency on the part of carriers in delivering *The Iron Age*: also, the loss of any papers for which the carriers are responsible. Our carriers are instructed to deliver papers only to persons authorized to receive them, and not to throw them in hall ways or upon stairs; and it is our desire and intention to enforce this rule in every instance.

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The Commercial and Industrial Outlook.

The accounts received from various parts of the country of the partial or complete suspension of manufacturing operations, would seem to indicate a belief on the part of manufacturers that the recent panic, from the effects of which we are now rapidly and naturally recovering, is likely to result in serious and long continued injury to trade. In some instances the suspensions announced have not been caused by want of means to carry on manufacturing operations, nor by the necessity of borrowing money to meet current expenses at usurious rates of interest, but rather, it would seem, by a fear of over-production, and the consequent losses likely to result from carrying large and accumulating stocks of goods over a season of long continued commercial dullness and monetary stringency. In the case of rail mills, it is easy to find a reason for such suspensions as have been announced, or are likely to occur, in the general stoppage of railroad building and improvement. We shall also expect to hear that a number of furnaces are blowing out, owing to the fact that certain grades of pig iron are in large supply and light demand, and that makers find it cheaper to stop making iron than to further increase their stocks, which are already greater, in some instances, than they can conveniently carry. This is to be expected, and might have occurred had there been no panic, owing to causes which, though necessarily temporary, must have led to a reduction in the make of pig iron before the end of the year. We fail to discover anything in the situation or outlook, however, to warrant the belief that any curtailment of general manufacturing is necessary, nor do we believe it will be so considered by manufacturers. Severe and far-reaching as the effects of the panic have been, advices from all parts of the country warrant the belief that the recovery will be rapid and general. In no part of our commercial or industrial system has any unsoundness been developed, although the events of the past three weeks have shaken the very foundations of business, and with the restoration of confidence in commercial circles the great danger has passed. Business, demoralized and rendered almost wholly speculative by the war, has gradually settled down again upon a sound and substantial basis; production was carried on with a regard almost solely to the legitimate consumptive requirements of the country, and neither domestic nor imported manufactures are in excess of the requirements of an ordinarily active trade. The most that the panic has done is to check for a time the exchange of commodities between the East, South and West, but it is probable that this delay will be in great part, at least, offset by the increased activity in the forwarding of produce before the close of navigation. In the South the effects of the panic are felt for the time in the lack of currency needed to gather the cotton crop, but the banks and merchants of the Southern States are fully aware of the importance of prompt action to relieve the planter, and there is reason to believe that no important part of the crop will be lost.

Throughout the Eastern and Middle States, and those portions of the West which have developed large manufacturing interests, there is, so far as we can discover, nothing to threaten serious and long-continued disturbance. The dry goods trade, usually regarded as a very correct barometer of the commercial situation, is reported to be in a much better condition than was expected. Country merchants are coming forward freely and purchasing liberally, and orders countermanded a week or ten days ago are renewed and, in some instances, increased. This indicates confidence in the future of trade on the part of those best able to correctly estimate the wants of consumers; and when it is remembered that the dry goods trade is usually the first to feel the effects of a panic and the last to recover from it, the fact that this trade is fairly active may be regarded as a hopeful indication of the situation. While, therefore, it is inevitable that those branches of manufacture directly or indirectly dependent upon the railroad interest should suffer temporary dullness, we see no reason to fear a general or protracted commercial or industrial stagnation. So far as the general iron trade is concerned, we believe that the next few months will witness a marked improvement, and that our iron manufacturers have so far prospered during the past two years that they will be able to tide over greater and more serious difficulties than those they are now called upon to encounter. We also think we are warranted in believing that there is no occasion for a general contraction of manufacturing operations, and that those who are able to carry on their operations as usual, will profit by the misfortunes of their neighbors who are compelled to suspend from lack of adequate capital and credit. On Friday last the manufacturers of Pittsburgh and vicinity assembled, in response to a call published in the daily newspapers, to consider how they could continue operations under existing conditions. The following report, presented by a Committee on Resolutions, consisting of Messrs. J. W. Chalfant, W. W. Watson, J. H. Ricketson, J. E. Schwartz, B. F. Jones, C. C. Hussey and E. W. Painter, was promptly adopted:

WHEREAS, While we believe the country was never more blessed with abundant crops, never so rich in wealth—and our city, when all are profitably employed, was never stronger and richer in individual and aggregated wealth; yet, on account of operations and speculations, set on foot elsewhere, in which we have no lot or parcel—the currency and exchange of our country are disturbed. Our trusted and sound monied institutions have their receipts diminished, and cannot afford to this community their accustomed liberal accommodations; therefore, we regard it proper and right that we should meet together and take some united action, if possible thereby to relieve this community, to some extent, from its present troubles.

Resolved, In order that the employee and employer may each contribute to the best interests of this community, and relieve our monied institutions, in a measure, from the excessive drain of currency, we recommend that the manufacturers only make payment not to exceed one-half the amount due the employees at each pay day on and after this date, until the currency and exchanges of the country assume their normal condition.

Resolved, By doing this, the manufacturer and workingman will co-operate, and each contribute to the best interests of this community, insuring the running of the mills and factories, relieving our banks from the excessive drain of currency, and aiding in restoring confidence, which alone is needed to give a complete return to our wonted prosperity.

As the present lack of currency is the only cause of embarrassment to the manufacturers of Pittsburgh, it is thought that this arrangement will satisfy the men and enable employers to continue operations without interruption. We think the committee have taken the right view of the situation, and if the banks are willing to accommodate them to the extent of half their usual requirements until the currency now locked up is returned to circulation, there will be no occasion for a diminished production.

Altogether, the outlook is far from discouraging, and while we are not disposed to underestimate the effects of the panic upon general business, we believe the greatest danger now lies in the disposition among merchants and manufacturers to overestimate them. Those who take counsel of their fears are very apt to magnify real difficulties, as well as to discover those which have no existence, and nothing is so fatal to general prosperity as general doubt and distrust.

The Canadian Market for American Hardware.

The changes which have taken place during the past two years in the British coal and iron trades, and the consequent increased cost of all English manufactures of iron, have opened the Canadian markets to many kinds of American hardware, and rendered it possible for us to build up a great and increasing export trade to that country in nearly all kinds of shelf goods. This fact is already apparent to many manufacturers, from the fact that Canadian retailers are coming here, or sending their orders to this market for supplies of goods which, a year ago, could not have been sold in Canada at cost; and a few large establishments have already started traveling salesmen through the Provinces with full lines of samples, and are building up a growing and profitable trade. We do not think, however, that the extent and importance of the opportunity now opened to us of securing the Canadian market is as yet generally appreciated by our manufacturers of hardware; but from careful inquiry we are satisfied that, if proper efforts are used to extend our trade in that direction, we can practically monopolize the market to the exclusion of all but a few classes of English specialties, which have a traditional reputation for superior excellence, and that the trade thus gained can be permanently retained, unless unforeseen changes shall occur to secure to British makers a continued enjoyment of the advantages they have lost and are losing. So far as England is concerned, cheap coal and cheap labor are among the things of the past, and her people are so far behind those of the United States in the application of labor-saving machinery that there is but little reason to fear that we will not keep ahead in this matter, however rapid may be the progress across the ocean. Cheap labor was a very profitable agent of production so long as it lasted, but it has proved a precarious foundation on which to build up a manufacturing prosperity, and without it British manufacturers find themselves unable to compete with their principal foreign rivals, or to arrest the decline of their export trade, even to their own colonies. It is because we have had to substitute machinery for hand labor, wherever such substitution was possible, that our products are now displacing those of British makers in markets hitherto regarded as closed to all but British manufacturers.

It must also be remembered that the political events of the past few years have effected a gradual, though marked, change in the sentiments of the Canadian people toward the United States. Since the confederation of the Provinces under the present central government of the Dominion, the loyalty of the people to the British crown and constitution has decidedly weakened; and realizing that their future development and prosperity is in a very great degree dependent upon the establishment of closer and more intimate commercial relations with this country, as well as the increase of facilities for inter-communication, they are rapidly outgrowing their old-time prejudice against the "Yankees," which was to a great extent only a reflection of the sentiment of the English people, distorted and exaggerated as such reflections are apt to be under such circumstances. During our war this sentiment developed into something almost amounting to a national hatred of the people of "the States," but since that time the change of which we speak has taken place, and the traveler from the United States finds a courteous welcome wherever he goes through the Dominion. The people have found us good neighbors, and while we fail to discover any evidences of a readiness on the part of the people at large, upon either side of the line, to consider the question of political union as anything more than a possibility of the remote future, there are no longer any prejudices against Americans and American products to be combated by our manufacturers in introducing their goods and securing for them a practical monopoly of the Canadian markets.

As we remarked above, the Canadian demand for American manufactures of iron is limited, as yet, to shelf hardware in almost all varieties. Sewing machines, agricultural implements of all kinds, axes, and some styles of edged tools, are manufactured largely in the Provinces, and the home market is thus well supplied, but there is little home manufacture of general hardware. On goods of this description the difference in favor of American manufactures, as compared with English, is said to be from 10 to 25 per cent., and we are informed by large Canadian buyers in this market that, were our manufactures no cheaper than those of England, preference would be given to them wherever they have been introduced. Our styles and patterns are more salable, being lighter and better finished, and generally stronger, because made of better metal. In builders' and saddlery hardware of all kinds our productions so far exceed those of English manufacturers that we already have a large Canadian trade in these specialties, and they have only to be introduced where they do not go already, to exclude competition. The same is true of bronze hardware, imitation bronze goods of all descriptions, cheap table and pocket cutlery, metal house furnishing goods, silver and nickel plated wares, and scissors and shears of all kinds. In these goods we can now underbid the provincial agents of British manufacturers, and even where the difference in price is a little against us, dealers would generally give our goods preference when afforded an opportunity for comparison, either of stocks or samples. Facility of delivery by rail is another very important consideration which cannot fail to influence Canadian buyers in favor of the New York market. We know of one instance in which a large retailer of Hamilton, Ontario, bought several heavy bills of goods in New York, and ordered them shipped at once. The next day he started for home by rail, and found his goods awaiting him at Hamilton. This is, perhaps, an exceptional instance of rapid delivery, but under almost any conditions goods may be ordered and delivered to any part of Canada on the line of railway communication within a week or ten days, while it takes from six weeks to two months to get goods from England. This is a very important advantage for New York, and one which will render it the more easy to secure the entire Canadian trade, now that our British competitors can no longer underbid us to an extent that is not more than offset by the superior quality of our manufactures.

We have presented these facts not because they are likely to be regarded as "news" by the hadware manufacturers of this country, but because we do not think it is generally appreciated that the present is a peculiarly favorable time for well directed and sustained efforts to extend our trade with Canada. During a recent trip into the Provinces we had an opportunity of making inquiry among hardware dealers concerning the Canadian market for American hardware, and are satisfied that, while the demands of the Provinces must ultimately be supplied here, even if no efforts are made to encourage trade, our manufacturers would find it immediately and permanently profitable to solicit business across the line by sending agents out with full lines of samples. The Canadian retailers find but little profit in English manufactures at present prices, especially where American goods have been introduced. We are informed that the agents of British manufacturers, in Montreal, are not disposed to fix prices on any goods except those they have on hand. They will take dealers' orders and fill them as promptly as possible, but prices cannot be fixed until the goods are received and the agents are notified what to sell them for. The reason for this is that, owing to the uncertain condition of the coal, iron and labor markets, manufacturers cannot tell a month or two in advance what their goods will cost them. Buyers are, therefore, placed at a great disadvantage, and when they must choose between buying on such uncertain terms and coming to the New York market, where they can select exactly what they want from manufacturers' stocks, make the best terms obtainable and get their goods cheaper, and of a better and more salable quality into the bargain, it is not probable that they will long hesitate whether to give American or English goods the preference when their attention is once called to the advantage of dealing with New York. Our manufacturers would do well, therefore, to seize the present favorable opportunity to secure Canadian orders, and if they treat their new customers with their customary fairness and liberality, they will stand in but little danger of losing the trade until Canadian manufactures shall have developed beyond any present expectation.

Our Shipbuilding Industries.

Notwithstanding the oft repeated assurances of the free trade press, that a protective tariff is fatal to shipbuilding and ship owing, and that while we continue to protect our home industries we must do so at the expense of our maritime interests, there are many gratifying indications of a healthy and permanent revival of our shipbuilding industry. That the long period of stagnation through which it has passed was not due to the tariff, must be evident to any one who will carefully and intelligently examine the statistics of our foreign trade. The war, which destroyed our commerce, gave England an enormous maritime advantage. During that period iron was generally substituted for wooden bottoms, and when peace was restored the British carriers were in possession of the carrying trade of the Atlantic with vessels which we could not build here until we had learned the art and provided the machinery necessary for working iron into the forms required. We were thus, for a time, placed in a position of disadvantage in competing with England, but the wise policy of Congress in maintaining the registry law in spite of the efforts of former ship owners and importers to overthrow it, has had the desired result. We have learned the art, provided the machinery, and gathered the skilled labor, and now we are in a position to compete on even terms with the world, to the extent of our yet limited capacity. In the mean time serious difficulties have overtaken the British shipbuilders, which give us a further advantage in competing with them. They no longer have either cheap labor nor cheap materials, and in consequence of the increasing cost of British ships, they are fast losing their monopoly of the business. Again, there is a demand for increased freight accommodations, and with improved prospects for ship owners has come a general prosperity to the shipbuilders. Thus the arguments of the enemies of home industry, by which they sought to secure for our shippers the temporary and doubtful benefit of buying cheap and inferior foreign built ships, have been answered, and ship building has revived in this country as it never could or would had Congress listened to the sophisms of those who demanded the free registration of foreign bottoms. During the year ended June 30, 1873, official numbers were granted to 262 steamers, aggregating 69,209 tons, and 645 sailing vessels, aggregating 76,219 tons, while during the two months ended with August, 100 steamers and 298 sailing vessels were registered, with an aggregate capacity of 74,877 tons. Taking these figures as the basis of an estimate, it is safe to predict that the total number of vessels built this year, as well as the aggregate of their tonnage, will far exceed those of any year since 1860.

The activity of which we thus have substantial proof, is not confined to any one locality. It is general, and extends to all branches of the business. Every shipyard which has been maintained during the long season of idleness which followed the war, is now the scene of unwonted activity, and the skilled workmen who were driven into other and less remunerative occupations have largely returned to their old trade, attracted by the promise of permanent employment and liberal wages. All the shipyards in the neighborhood of New York are busy and with orders ahead, and much of the work of repairing and reconstruction, formerly done abroad, is now entrusted to our own shipbuilders to be done as cheaply and as well. With the progress of iron shipbuilding on the Delaware our readers have been kept acquainted from time to time, and it will surprise no one to learn that every shipyard from Chester to Wilmington is kept busy upon iron steamships, including several first-class ocean steamers. All things considered, our American iron bottoms are as much better than those which could be built at the same cost in British waters, as our American iron is better than the average of English iron; and, under intelligent direction, our workmen are developing a skill in iron shipbuilding which is a matter of surprise even to their employers, while in our machinery we have anticipated British progress by many years. Our iron ships are lighter, in proportion to tonnage, than those built of English iron, and the greater strength and toughness of the metal used in them renders them much stouter and more durable than the average of British ships, which, according to an eminent English authority, are built of "plates as brittle as glass." With the growth of our steam marine this business will probably extend to the Chesapeake Bay, which, with the development of the mineral resources of the Virginias, will possess many natural advantages as a shipbuilding center. New York is too remote from the principal iron producing and manufacturing districts, and lands along our river fronts suitable for ship yards are too valuable, to encourage the belief that iron shipbuilding will attain any considerable importance as a local industry, and it will probably continue to expand along the Delaware until equal or superior advantages are offered for its establishment further south.

But the benefits of the revival of which we have spoken are not confined to the iron shipyards. There is also a growing demand for wooden bottoms. The old shipyards along the New England coast, which used to launch famous whalers and packets, are again busy after long idleness. In Bath, Maine, fifteen hundred men are now employed building and rebuilding wooden tonnage. One vessel of 2000 tons is now on the stocks, three of over 1200 tons each will be launched during the next few weeks, and

several other large vessels are reported as approaching completion. At Portland, Belfast, Yarmouth and Kennebeck a steadily increasing activity is reported, and a large number of vessels are now in course of construction at these ports, ranging in size from 400 to 1200 tons, the greater number being from 500 to 1000 tons. All along the Massachusetts coast the greatest activity prevails, and it is estimated that during 1873 the tonnage of sailing vessels built east of New York will aggregate not less than 100,000 tons. Further south we find that the shipyards along the Atlantic coast from Wilmington to Charleston are sharing the general improvement, and most of them are employed to their capacity upon new vessels. The difficulties which have overtaken the British iron trade do not account for any part of this revival of wooden shipbuilding, however much our iron shipbuilding interests may be promoted thereby, and in the general improvement, which is shown by the facts above presented, is found abundant proof that protection protects even shipbuilding.

In reply to our inquiry for exact information respecting the reported shipment of considerable quantities of pig iron from the Lake Superior district to Great Britain, the Marquette *Mining Journal* publishes the following record of exports to foreign ports, which it claims to have copied directly from the books of the Custom House:

	Tons
June 16th, by propeller City of Montreal, to Toronto Car Wheel Co.	300
July 1st, by propeller Bristol, to E. L. Hedstrom, Toronto	96
Same date, same consignee, Montreal	305
Same date by propeller City of Montreal, same consignee, Toronto	330
July 10th, by propeller R. W. Standley, to E. L. Hedstrom, Toronto	200
Do., do., Montreal	197
July 24th, by propeller Bristol, to E. L. Hedstrom, Toronto	91
Do., do., Montreal	313
Sept. 14th, by schooner Riverside, for Toronto Car Wheel Works, Toronto	535
Sept. 18th, by propeller City of Montreal, for Toronto Car Wheel Works Toronto	283
Total, tons	2,690

If these figures are correct—and we have no reason to doubt the word of the *Mining Journal* on this point—we can only conclude that we were misinformed, and that if any iron has gone from Lake Superior to Great Britain, it has been reshipped from one of the Canadian ports. It is a curious fact, however, that so many people should have been deceived in the matter, and that persons prominently connected with the iron trade of that district should have imparted to the gentlemen whose names we gave as our authority, information so far from what the *Mining Journal* claims to be the truth of the case. Our only conclusion is that the local papers do not keep their readers posted on the course of the iron movement, or else that they are not much read by the trade.

Scientific and Technical Notes.

Allthough the question as to

THE PROPER HIGHT FOR BLAST FURNACES

seems to have been answered by experience in this country in favor of high furnaces, there are many iron masters who still cling to the belief, and not without reason, that low furnaces are the cheapest and best. The *Ironmonger*, in describing some new furnaces in Warwickshire, England, says: The furnaces have been designed and built under the immediate supervision of Mr. Millward, who has profited by Messrs. Addenbroke's experiment with tall furnaces; for though they comprise all the improvements of the Middlesborough plant, yet their hight has been confined to the old Staffordshire standard of fifty feet, with fourteen feet bosh, and six feet hearth. It must be some little consolation to the Staffordshire ironmaster of past years to know that, in this matter at least, he knew what was best for himself; and it has to be proved that from seventy to seventy-five feet is not the maximum economical hight for furnaces in which the hard coke of Durham reduces the lean stone of the Cleveland Hills. All the arrangements of these new furnaces in Warwickshire possess an air of compactness, and indicate the practical foresight of the designer. Between the furnaces there is a lift worked by a pair of coupled engines, which will send up three laden barrows at a time; the gas of the furnaces will be utilized upon the patent of Messrs. Addenbroke-Millward, and the five boilers and the three coke ovens will all be fired by the gas. Excepting the charges nothing will have to be lifted, for the hearths are raised nearly ten feet above the ground, and the railway trucks run up to the furnaces. The furnaces are encased in iron supported on columns, and the whole of the lining is supported on arches which spring from column to column. The stack is what is known in Staffordshire as a "stogger," for whilst its diameter is 10 ft. at the bottom, it is 11 ft. 6 in. at the top. It is 180 ft. from the surface of the ground.

The correspondent of an English journal, speaking of

IRON FORTIFICATIONS IN EUROPE,

says: The use of iron plates and chilled iron castings will take place to a large extent with the new fortifications of Metz. On both sides of the new fort of St. Privat there are being built armored flank batteries, which will command the valleys of the Seille and Moselle, while two rotating iron-plate towers are intended to secure communication with the rear of Fort St. Quentin. The structures will either be shields of iron plates, such as those tried at Portsmouth, or they will consist of arched casemates, built up of large blocks of chilled iron castings, to be fitted together by grooved flanges, thus avoiding all bolts, washers, and nuts, which invariably will fly off when such a structure is hit by a heavy projectile. These iron casemates, which only contain one large gun each, and are provided with embrasures, are then to be thickly covered with earth, and will be entirely shot and bomb proof, as has been shown by the extensive trials which were carried out at Tegel, near Berlin, some three years ago. After heavy firing at short ranges a shot succeeded in cracking one of the chilled blocks, which afterward resisted all attempts at destruction, and showed that the casemate even then was as safe as ever before. A similar system of iron batteries and forts seems to be proposed for the protection of the coasts near the mouths of the Elbe and Weser.

During the past few weeks an interesting application of

HYDRAULIC RIVETING TO BRIDGE WORK

has been in successful operation on a lattice bridge of 175 ft. span, which is being erected to carry Primrose street over the Metropolitan extension of the Great Eastern Railway, in London. The hydraulic riveter used is that of Mr. Ralph H. Tweddell, of 31 Duke street, Westminster, and the arrangement adopted, although of an experimental and, to a great extent, of a temporary character, is very compact, and has given highly satisfactory results. On the vertical struts of the grider the portable machine easily puts in ¾ in. rivets at the rate of 250 per hour, while, when we last saw it, it was putting in 1 in. rivets through eight thicknesses of 7-16 in. plates at the bottom flange of the girder, at the rate of 150 rivets per hour. The work on this bridge being very urgent, there has not been time to perfect some modifications which will enable every rivet in similar girders to be closed by the hydraulic riveter; but Mr. Tweddell, in conjunction with Mr. Ashbee, the chief assistant to Mr. Edward Wilson (who is the engineer to the Great Eastern Extension Works), has obtained some very good experimental results with an arrangement designed to attain this end. Where so much depends upon sound riveting, as is the case with iron bridge-work, the application of Mr. Tweddell's well-known hydraulic riveters is an important advantage, while the manner in which this application has been carried out at Primrose street, shows that the system is one which, beyond the excellence of the work it turns out, possesses important conveniences, the riveter being slung from a kind of traveling crane, which assists in the erection of the work.

Since the late war the German artillery has been strengthened by the addition of three

NEW PATTERNS OF HEAVY ORDINANCE.

These are described, respectively, as the 21-centimetre reinforced siege gun, the 28-centimetre rifled howitzer, and the 30·5 centimetre coast gun. The latter is said to be the most powerful gun in existence. With 120 to 130 lbs. of prismatic powder of from 1·74 to 1·76 specific gravity, it fires a chilled cast iron shell of 600 to 610 lbs. weight, with an initial velocity of 490 metres, or 1574 feet Rhenish, equal to 1607 ft. English, per second, which is said to have never been attained before by any rifled gun. At a distance of 1200 paces, or 988 yards, it sends the shell clean through a 14 in. armor plate and backing. The gun is very handy and easily manœuvred; it requires one man to handle the breech piece, two to lift up and insert the shell by means of a davit lift, two men to give it its greatest elevation of 17° in 16½ seconds, or its greatest depression of 6½° in 11 seconds, and two men to give it its lateral direction by means of a chain running over jack pulleys.

The new French field gun, named the

"CANON DE SEPT,"

which is likely to be adopted as the standard field gun of France, is made of bronze, with a bore of 8·5 centimetres, length of barrel 187·5 centimetres, and contains 14 grooves, 1·5 millimetres deep, these being twisted from right to left at an angle of 8 deg. 32 minutes, or of 21·2 calibres to a complete twist. The breech-closing apparatus is a screw, which fits in a steel nut that is inserted in the end of the barrel, flush with its end face. Screw and nut have their threads cut out at three-sixths of the circumference, so that the former may be inserted in the latter by simply pushing it inward, when it is fastened in it by a turn to the right of 1-6th of its circumference. The screw rests in a kind of swing door, similar to the first Prussian model of field gun with piston breech, which supports it when drawn out of the barrel, and facilitates its insertion. The inner head of the breech screw has a slightly concave surface, and bears on the side three twisted grooves, which arrangement is intended for extracting the metallic cartridge shell, which serves as gas check. This shell consists of a thin brass bottom, which is provided with a perforated ignition cup, while the cylindrical part is made of tinned sheet iron. The touchhole is bored at an angle through the breech screw, and opens at the center of its inner surface in the gun just where it meets the ignition cup, so that the fire ignites the cartridge centrally. The latter consists of 5 discs of compressed gunpowder, each weighing 0·226 kilogrammes, and provided with a central canal of 5·2 centimetres in diameter; their total weight is 1·13 kilogrammes. The projectile is an elongated shell, 3 calibres long, weighing 6·9 kilogrammes and is provided with two lead rings as guides. The first trials with this gun, at the Polygon of Vincennes, date back as far as 1870, but only in 1872 was it tested again at Calais in its improved form, and its chief merit seems to be its low trajectory, though it may leave something to be desired with regard to range, accuracy, and durability.

The Russell & Erwin Manufacturing Company, of New Britain, have given notice that they will suspend work in two weeks, unless in the interim there may be such a change in the financial prospect as will warrant them in keeping their factory running; and that during the limitation the factory will run but three days each week.

Spain's Mineral Resources and the Civil War.

Official statistics from Spain are rare, and in the present anarchical state of the country, we dare not look for any for a long time to come. Whatever we do receive of a more recent date is, therefore, all the more welcome, inasmuch as it enables us to measure the importance of mineral development held in check by the civil strife. This relates more particularly to lead. The normal lead production in Spain being second to none among the various European nations, we are glad to place before our readers some reliable data on this interesting subject. The following is a condensed translation of the report of Mr. J. Jooris, Belgian Minister *ad interim* near the Spanish Republic:

SPAIN'S MINING INDUSTRY FROM 1865 TO 1870, INCLUSIVE.

MADRID, Aug. 21, 1873.

I beg to submit to your excellency an extract from the official report emanating from the Ministry of Internal Resources, just published, and embracing the years 1865-1870. Spain's mineral production in 1870 has been 542,000,000 rials, equal to 136,000,000 francs—257,000,000 rials raw produce of the mines, and 285,000,000 rials manufactured. The increase over and above 1869 was 38,000,000 rials. This, of course, excludes salt, raw and manufactured. Of productive mines there were in 1870 in operation 2206, 66 placers and 38 entrepots of dross, the whole covering a surface of 48,000 hectares, and giving occupation to 40,500 individuals, among whom 33,000 were men, 1500 women and 6000 children. There were 266 blast furnaces, occupying some 10,000 workmen. The excess of production over 1869, in metrical quintals, was as follows: Iron, 1,253,000; lead, 406,000; copper, 888,000; brimstone, 27,000; phosphate, 100,000; and coal, 715,000. The salt monopoly being abolished since January 1st, 1870, private production of the mineral figures up for the year 380,000 metrical quintals.

Manufacture of metals shows for 1870 the following excess over 1869: Bar iron, 200,400 metrical quintals; lead, 11,000; silver bearing ditto, 2500; copper, 18,000; spelter, 10,000; quicksilver, 2216; and sulphur, 4000.

Spanish export during 1870 has also shown an increase. The following is a statement of the quantities exported during the year, in tons of 1000 kilos each: Steel, in bars, 18; quicksilver, 1390; copper ore, 3300; ditto, bars, 900; manufactured, 78; wrought iron, 88; old rails, 4000; pig lead, 38,000; ditto, silver bearing, 39,530; wrought ditto, 27; spelter, in slabs, 1257; galena, 1000; pyrites of iron, 140; antimony, 57; copper, 164,000; tin, 2; iron, 253,000; manganese, 24,000; spelter ore, 3400; calamine, 48,000; phosphate of chalk, 40,000; and jet, 23. The Badajoz-Lisbon Railway took, in 1870, 27,000 tons of Spanish phosphate of chalk that were shipped to England.

Iron production from 1,800,000 quintals in 1866 rose to 4,300,000 quintals in 1870. This increase of iron production in Spain has been due to the great demand in England for good classes of iron for steel manufacture by the Bessemer process, and to the quantities imported from Spain into France since the Spanish export duty was abolished in 1866.

Lead production from 2,600,000 quintals in 1866 rose to 3,180,000 quintals in 1870, inclusive of the yield of the Lenares mines, which the state began to rent to mining companies in 1869. Silver bearing lead rose from 213,000 in 1866 to 332,000 in 1870.

The silver product rose from 17,000 quintals to 26,700. The copper production, owing to the great development of mining in the province of Hueloa, rose from 2,800,000 quintals to 4,000,000. This quantity included the Rio Tinto mines, lately sold by the state. The spelter production rose from 700,000 quintals to 1,200,000. The excess of the five years under review over the previous quinquennial period has been 2,500,000 quintals. The coal production increased 63 per cent. between 1866 and 1870; from about 4,000,000 quintals in 1866 it rose to 6,000,000 in 1870. Phosphate of chalk from 93,000 increased to 280,000. Quicksilver: The Almaden mines of the state, from 115,000 quintals, have augmented to 240,000.

The Spanish iron industry has given remarkable results during the period under comparison. Pig iron rose from 400,000 to 550,000 quintals, wrought iron from 300,000 to 360,000. During the last few years iron industry in Spain has, however, been on the decline once more. Three causes have been instrumental in bringing about this deplorable result: one, high coal; two, high wages; and, three, duty free import for railroad purposes. The manufacture of steel has also declined. Lead manufacture has been in a high state of prosperity. Thus there have been produced of soft lead 600,000 quintals in 1866, and 750,000 in 1870; silver bearing lead from 70,000 quintals has risen to 109,000. The lead production during the quinquennial period 1865-1870 has aggregated 3,800,000 quintals, an increase of 500,000 quintals upon the previous five years. This lead production is the principal mineralogical resource of the Spanish Peninsula. It furnishes to Spain its leading article of export, and in normal times the country outstrips England in this item, which simultaneously produced but 3,600,000 quintals during the five years under review. Thus Spain turned out from 1865 to 1870 of lead ore 16,600,000 quintals, of pure lead 3,809,890. England has produced but 4,800,000 quintals of ore, but its lead is pure galena, yielding from 73 to 74 per cent.; while Spanish lead yields but 15 per cent. pure. Murcia even yields but from 8 to 12 per cent. pure, which accounts for the circumstance that the province, although producing 65 per cent. of the whole lead ore production of Spain, in reality represents but 32 per cent. of the total Spanish pure lead yield.

Silver, from 23,000 kilos. in 1866, has risen to 29,000 in 1870; the total yield has been 132,000 kilos. for the five years, an excess of 51,000 kilos. over the previous period.

Copper, from 35,000 quintals rose to 52,000; for the five years the yield was 200,000, an increase of 34,000 upon the previous period. This included the Rio Tinto State Smelting Works, which produced 51,000 quintals during the period of 1866-1870. Of spelter, during the same period, there were produced 128,000 quintals, an increase of 45,000 quintals upon the previous five years. Quicksilver production showed an increase during the same period of 55,000 quintals. The Almaden State Mines, during the last-named five years, yielded 35,500 quintals, which showed an increase of 8000 quintals.

As a summing up, the official statement shows that Spain's mining industry produced during the five years under review 278,000,000 francs, and its pure metal yield 323,000,000 francs, which excludes salt.

The government mines have yielded:

	Francs.
Almaden Quicksilver Mines	96,000,000
Rio Tinto Copper Mines	8,000,000
Lenares Lead Mines	8,000 000
State Salines	165,000,000

SPAIN'S EXPORT OF ORE.

	Metric Quintals. 1866.	Metric Quintals. 1870.
Iron	531,000	2,500,000
Lead	33,000	10,000
Copper	112,000	1,638,000
Spelter	353,000	500,000
Phosphate	....	155,000
Tin	140	17
Manganese	300,000	250,000
Pyrite of Iron	6,500	1,400

The foregoing shows that the iron ore export quintupled, while that of lead ore has decreased, the country beginning to work nearly all its own ore. Copper has been fourteen times what it was in 1866.

SPAIN'S METAL EXPORT.

	1866. Metric Quintals.	1870 Metric. Quintals.
Lead and Silver-bearing Lead	500,000	700,000
Wrought Copper	23,000	9,000
Cast Copper and Black	458	33,000
Quicksilver	2,742	13,900
Spelter in Slabs	6,500	12,500

SPAIN'S PROGRESS SINCE 1861.

	1861. Metric Tons.	1865. Metric Tons.	1870. Metric Tons.
Export of ores of all kinds	4,900	106,000	500,000
Export of pure metals	15,000	41,000	84,000

The foregoing shows that the export of ore was not augmented to the detriment of the country, but that hand in hand with it there increased the export of pure metals.

The Belgian Minister, *ad interim*,
(Signed.) J. JOORIS.

Events in Spain are thus shown to have a most important bearing upon the general production of metals, lead in particular, and the not unimportant advance in the latter since February is fully accounted for. The disintegration of Spain seems so deep-rooted just at present, that, even supposing the country were to be pacified now, it would take some time ere capitalists would have sufficient courage to assist in rearing once more the ruins which have been spread broadcast throughout the land.

Diamond Cutting.

The *British Trade Journal* publishes the following interesting account of the manner in which diamonds are cut and polished: The art of a diamond cutter is not easily acquired; and the monopoly of it which the Dutch have until quite lately enjoyed is really not astonishing; and there is no telling how long they might have kept it to themselves had not jealousies recently sprung up between the employers and the journeymen, which induced some of the latter to settle in London, and to pursue their avocation there. These Dutchman have prospered in the metropolis, but the eyes of Birmingham have been upon them, and henceforth they will have to contend with some native opposition. Mr. Spencer has at length, after a long time spent in maturing his plans, succeeded in obtaining the requisite experience and machinery, and, moreover, he has obtained men who are able to successfully accomplish the delicate work required. Diamonds, when found by the diggers, are most peculiar in shape, the majority of them appearing to have been submitted to the operation of cutting, and afterward to have been squeezed or compressed, so that the regularity of the facets which they bear has been partially destroyed. Others appear to have been in a state of fusion, and to have "set" in most fantastic shapes. All, or nearly all, bear flaws of some kind, and the preliminary operation is to remove these defects. Having ascertained which way the "grain" of the stone runs—for diamonds have grain, like wood, although it is not quite so readily discovered—it is firmly fixed in a very hard cement, with the flaws uppermost. Taking a diamond with a sharp edge—which is also set in cement contained in a cup with a long handle—the operator proceeds to "saw" a small trench in the rough diamond, just beneath the flaw, taking the utmost care to catch the dust produced by the sawing process in a small box, as it is valuable for polishing diamonds and other purposes. When the trench is cut to a slight depth, the workman inserts the blade of a sharp instrument, and on this being tapped sharply, the diamond splits, generally with marvelous precision, and the defective part of the diamond is thus removed. Some stones, however, cannot be thus dealt with, in consequence of the grain not running smoothly. Any attempt to split them would surely destroy the greater part of their beauty, and they are therefore cut with a very finely tempered saw, sprinkled with plenty of diamond dust, moistened with olive oil. Supposing the diamond to have been freed from all flaws and blemishes, it now requires cutting. The cutter must necessarily be a man of great judgment and taste, for he has to decide, on inspecting the rough stone, in what form it shall be cut, so as most effectively to display its brilliance and beauty, and at the same time to preserve as much as possible of its weight. The workman having decided whether the diamond shall form a rose or a brilliant, proceeds to cut it accordingly. To his taste, also, is left the decision as to whether the stone shall have twenty, twenty-four, or more facets. To cut these facets he fixes the diamond in cement, and proceeds, with another diamond of about equal size, to rub away the surface of the stone, until a perfectly flat surface of the size required is formed. A skillful workman will so manipulate the diamond, that he will cut facets on the stone *on* which, and on the one *with* which, he is operating, simultaneously. Of course, the dust and small chips formed in this process are also carefully preserved. One facet having been formed, the stone is turned in the cement, and a second facet is cut in a similar manner. Such is the marvelous skill attained by the workman, that he will cut the whole twenty or twenty-four facets of exactly similar size—or, at least, so nearly of a size that a microscope only would reveal any discrepancy. Having thus, with great care and nicety, brought the diamond to the shape required, the facets, which of necessity are rather rough, have to be polished. This operation requires scarcely less skill than that of cutting. The polishing wheel is a circular table of iron, known by the Dutch name of "Schyff." By means of machinery it is made to revolve with extreme rapidity, sometimes at the rate of nearly three thousand revolutions per minute. On the surface of this iron table is placed a quantity of very fine diamond powder, moistened with olive oil. Before the diamonds are polished they are set in a cone composed of an alloy of lead and tin, and this cone exactly fits in an iron cup, which is held steady by a long handle fixed in the wall of the room, or some convenient post. The facet of the diamond, which forms the summit of the cone, is then pressed on the revolving table, and held down by weights of lead. Of course, the weights vary, some stones requiring two pounds pressure, and others as much as thirty pounds. The workman who superintends the operation has to exercise the most extreme caution, for should the diamond become loose in the cone, it would, in all probability, be much damaged by the edge of the facet being ground away. One facet having been properly polished, the stone is taken from the cone, and refitted with another facet uppermost, and the same operation is repeated. It will be seen that the polishing of a diamond thus occupies a considerable time; and, as it occasionally happens that a gem may be softer in one part than in another, the workman requires to be constantly on the alert to regulate the pressure on the stone and the revolutions of the table. When it is also borne in mind that some of the diamonds cut and polished in this manner are smaller than the head of a pin, and that perhaps they have to be cut with twenty-four facets, the extreme delicacy of the operation will be at once apparent.

Dangers of Railway Travel in England.

A correspondent of the *Times* writes as follows concerning the English railway panic:

Quite a panic has sprung up among railway travelers. For the last five or six weeks—ever since the Wigan disaster, in fact—there has been scarcely a day without an accident of some kind. August is a very busy tourist month, and the railways generally break down about this time of year from press of work. This is their harvest, and they try to reap it with their ordinary staff. The consequence is that trains are overcrowded, there are delays at the stations, and engine drivers have to make up by extra speed for the time which is thus lost. The whole body of railway officials seem to get into a feverish, reckless state of mind, and there is less caution than usual at a season when it should be increased. The rush of accidents follows as a matter of course. It was hoped that when August was over there would be fewer accidents, but instead of diminishing, they are becoming more frequent. In August it was bad enough to have one every other day or so, but now there are usually two a day. At this rate in November we may expect one every half hour. Now it is a collision; now it is a train broken in two by defective facing points, one part going on one set of rails and the other on the other line, till the couplings break and the carriages crash over on each other; now it is cattle on the line. Within a fortnight there have been three accidents—one a very bad one—from cattle on the line, but the railway companies are quite above providing engines with cow-catchers. They are content with fences, which a fat bullock can take at a run, and bullocks are not exactly as agile as hogs. Pneumatic brakes is another American device which they would do well to borrow. As it is, the brake power is badly deficient, and hence engine drivers bear down on each other in full sight without being able to stop before the collision happens. The multiplication of facing points is owing to the desire to avoid laying down fresh lines of rail at important junctions. The main line is turned into a series of goods yards, with shunting constantly going on, and expresses rushing through without stopping. A controvery has arisen as to whether the rate of speed on railways ought not to be reduced. Ordinary trains go at the rate of thirty or forty miles an hour, and expresses at the average rate of forty-five or fifty miles an hour, but often at sixty or seventy for a spurt. Of course, if the choice lay between going safely and at a moderate speed, or going very fast with a good chance of being killed, most Englishmen would unhesitatingly pronounce for the latter. But they have not yet been convinced that express traveling is necessarily dangerous if proper precautions are adopted.

How Mirrors are Silvered.—The following description of "silvering" plate glass for mirrors is mainly founded upon the method pursued at St. Gobin and Ravenhead. After polishing, each glass tablet intended to make a looking-glass is silvered, or, more correctly, coated on one side with an amalgam of tin. In the preparation of this amalgam tinfoil is used, but it must be beaten from the finest tin, and possess a surface similar to that of polished silver. The art of silvering is simple, and merely requires dexterity. The glass plate having been thoroughly cleansed from all grease and dirt with putty-powder and wood ash, the workman proceeds to lay a sheet of tinfoil smoothly upon the table, carefully pressing out with a cloth dabber all wrinkles and places likely to form air bubbles. He spreads over it a quantity of mercury, taken care that all parts are equally covered, and then the glass plate is pushed gently on to the surface, commencing at one edge. The glass is allowed to remain for twenty-four hours. It is then removed to a wooden incline similar to a reading-desk, to allow of the excess of mercury draining off. As the amalgam gradually sets, the incline is increased till finally the plate reaches the perpendicular, when the process is finished, and the mirror removed to the store-room.

Trade Report.

Office of THE IRON AGE,
WEDNESDAY EVENING, Oct. 8, 1873.

The past week has been quite free from excitement, and business in all the financial markets has proceeded much as usual. There has been a gradual recovery of confidence and a general disposition to readjust matters as quickly and easily as possible. But one important failure has occurred on the Stock Exchange during the week, and it is generally understood that those houses which have tided over their difficulties thus far, are now in a position of comparative safety. Two large houses in the dry goods trade have been compelled to suspend, but in neither case are creditors in any danger of losing either principal or interest. Both houses have ample securities and practically unlimited credits, but the former could not be converted into money without ruinous sacrifices, and the latter were not immediately available, owing to the fact that the banks were unable to place at their command the amount of currency needed to meet their current expenses, much less to pay their maturing liabilities. In neither case is the embarrassment likely to be more than temporary, as it results solely from the inability of the houses in question to immediately realize upon their abundant assets. So far as we can now recall, not one important commercial failure has resulted form insolvency, and as soon as the banks are in a position to extend their usual accommodations to the business community, everything will go on as usual. Merchants who cannot collect cannot pay—especially when the best securities cannot be converted into currency—and a dead lock is thus produced, which will last until the stringency is past and the currency now withdrawn is returned to circulation.

During the week past the money market has been very irregular, the rate on call loans ranging from 7 to ⅛ of one per cent. per day, and prime mercantile paper has been in limited demand at 12@18 per cent. This is better than we were able to report last week, but there is still room for great improvement, which, all things favorable, will take place during the next week or ten days.

The gold market has been without important feature, and the premium has fluctuated between 111¼ and 109⅝. The following shows the highest and lowest daily quotations:

	Highest.	Lowest.
Thursday	110⅝	110⅛
Friday	110⅝	109⅝
Saturday	110⅝	109⅞
Monday	110⅝	109⅝
Tuesday	110⅝	110⅛
Wednesday	110⅛	109⅝

The stock market remained strong during the early part of the week, but a tendency to weakness was developed. A great many purchases of stocks have been made during the past three weeks by small capitalists seeking profitable short investments, and few of the shares thus withdrawn from the market have yet found their way back into the street. The principal speculative dealings of the week have been in Western Union, New York Central, Pacific Mail, Wabash and Lake Shore. The highest and lowest of to-day's quotations of active shares are given below.

The bond market has been irregular, but has acquired considerable strength on account of the purchases of the savings banks to replace the government bonds sold to the Treasury during the panic. Railroad bonds are utterly flat, and quotations are nominal. We give below the closing quotations of governments.

The following tables show the course of foreign trade during the week:

IMPORTS.

	1871.	1872.	1873.
Ent. for week	$7,033,388	$8,644,238	$7,764,447
Prev. reported	293,312,430	334,579,173	308,211,676
Since Jan 1	$300,345,818	$343,223,411	$315,976,123

Included in the imports of general merchandise for the week are:

	Quant.	Value.
Anvils	327	$3,527
Brass goods	20	3,531
Bismuth	2	1,011
Bronzes	95	25,404
Chains and anchors	146	7,67
Copper		703
Cutlery	80	22,211
Guns	241	18,536
Hardware	134	11,629
Iron, pig, tons	2,200	74,959
R. R. bars	7,694	147,611
Iron cotton ties	753	2 454
Iron, tubes	1,580	2,937
Iron, other, tons	38	4,672
Lead, pigs	2,197	12,455
Metal goods	143	25,147
Nails	29	1.194
Needles	9	5.577
Nickel	2	2,088
Old metal		91
Platina	2	5,045
Plated ware	4	1,302
Per. caps	7	1,572
Saddlery	14	2,058
Steel	4,635	37,420
Silverware	4	365
Tin, boxes	29,129	245,091
Tin, 24) slabs lbs.	63,904	18,023
Wire	1,526	24,329
Zinc	2,561	312

EXPORTS, EXCLUSIVE OF SPECIE

	1871.	1872.	1873.
For the week	$7,558,506	$4,716,438	$8,378,130
Prev. reported	173,689,653	166,646,895	215,168,228
Since Jan. 1	$178,248,249	$171,363,333	$223,546,358

EXPORTS OF SPECIE.

Total for the week	$674,861
Previously reported	41,387,341
Total since January 1, 1873	$42,062,192

Government bonds closed as follows:

	Bid.	Asked.
U. S. 6s, 1881, reg	115¾	116
U. S. 6s, 1881, c., large	115¾	116
U. S. 6s 5-20, 1868, reg	108⅝	—
U. S. 6s, 5-20, 1862, c., large	108¾	109⅛
U. S. 6s, 5-20, 1862, c., large	108⅝	—
U. S. 6s, 5-20 1874, r.	109¾	110
U. S. 5-20 1864, c., large	109	110
U. S. 5-20 1865, r.	111	112
U. S. 5-20 1865, c., large	113⅛	—
U. S. 5-20 1865, new, r.	113	113⅛
U. S. 5-20 1865, new, c., large	113⅛	—
U. S. 5-20 1867, r.	113⅛	—
U. S. 5-20 1867, c., large	114⅛	115
U. S. 5-20 1868, c., large	114	115
U. S. 10-40 reg	108	109
U. S. 10-40 c., large	108⅝	109⅝
30 Year Currency Pacifics	111⅛	111⅝

The following were the highest and lowest prices of stocks to-day:

	Highest.	Lowest.
N. Y. Cen. & Hudson Consolidated	93¾	91¾
Lake Shore	75⅞	72¾
Rock Island	94¼	92¾
New Jersey Central	93⅝	93¼
Del., Lack. and West	91¼	90
Wabash	46⅞	45
Harlem	114¾	111¾
Western Union Telegraph	71⅞	67¾
Northwestern	45⅛	44¾
Northwestern preferred	68¾	69
Milwaukee & St. Paul	34⅜	33¼
Milwaukee & St. Paul preferred	59½	58
Pacific Mail	35¼	33
Erie	49	47¾
Ohio & Mississippi	29¼	28
Union Pacific	20⅛	19
C. C. & Ind. Central	23¾	22¾
Atlantic & Pacific Preferred	16	16
Hannibal and St. Joseph	25	24
Consolidation Coal	46⅝	46
United States Express	27	26½

GENERAL HARDWARE.

We cannot report any improvement in the amount of orders received by our city houses, and remittances have fallen off decidedly. Still the situation is more hopeful than at our last writing. All danger of any general financial catastrophe seems now to be past, and the worst that is feared is that confidence will not be recovered until too late to save the fall trade. If this is the case the trade next spring must be very large. The country is unquestionably bare of goods, and is really prosperous. This season opened very well, and the fall trade would have been large and satisfactory had not the financial trouble come upon us. We know of travelers who are sending home fair orders, but the majority are doing very little. While the duty of all is to be careful and conservative in a time like this, it is foolish and weak to be carried away by a groundless fear, as many business men have been.

Russell & Erwin Mfg. Co. have made the following changes in their list of Sleigh Bells, dated Sept. 20, and published by us in our issue of Sept. 25:

FANCY BODY STRAPS.

No.	343	346	347
Per Strap	$2·25	2·50	2·75

In our last we reduced the price of Brass Kettles to 50 cents per lb. It is proper for us to state that this is not a reduction by the manufacturers, whose price remains as heretofore, but is the quotation of leading jobbers who bought their stock at lower prices than manufacturers are now asking.

Some little time ago we noticed the purchase by the Yale Lock Mfg. Co. of the business of the Whitney Mfg. Co., of this city. It will be seen by their advertisement on our 25th page that they have now ready an extensive line of ornamental Real Bronze goods, which, we are pleased to learn, give excellent signs of promise. All the goods of the Yale Lock Co. have been distinguished for fine workmanship and good taste, and we believe their new line of Bronze goods will at once take a high rank in the market. Within two years the business of this Company has more than doubled, and they have never been so busy as in the past seven months, during which time they have run some parts of their works 12 and 14 hours a day. Last spring they added a one-story wing to their main building, and are now erecting a new foundry 85 by 32 feet, a boiler house, in which they will place a new boiler of 60 horse-power, and another wing to their main building, in which will be located a pattern vault, japanning ovens, etc. They now employ considerably over a hundred hands, and will increase their force when their new buildings are finished.

Plumb, Burdict & Barnard are getting out an illustrated catalogue and price list of their manufactures, which will be, we suppose, the most complete and handsome thing of the kind ever issued. The illustrations will be full size representations of the different Bolts and Screws they make. We have seen proofs of some of them, which are very beautiful in workmanship, and represent the goods very distinctly.

Trade in foreign Hardware continues to feel the depressing influence of the late financial disturbance, although some houses report an improvement in the demand from the interior. There are no changes in values to report, stocks are unusually light for this season of the year, and holders show little anxiety to force sales.

Since our last writing the Nail manufacturers of this city held a meeting, and decided to hold Nails, in lots less than 100 kegs, strictly to the card rate, viz., $4·75, net, for 10d.; for large lots, say, 500 to 1000 kegs, orders for immediate delivery could be placed at $4·50, net. Business in this branch is exceedingly dull; but with very light stocks and assortments badly broken, holders exhibit no anxiety to press sales, and orders for future delivery at ruling rates are positively declined.

Graham & Haines, 88 Chambers street, issue under date of Oct. 10th, the annexed list of corrections to their discount sheet of July 10th, 1873. The goods of the following manufactures are unchanged: Hotchkiss Sons, Blood, H. Disston & Sons, and Sandusky Tool Company.

	Dis. per cent.
Pad Locks	20
Compasses and Patent Dividers	30
Dividers without Spring, same list	35
Inside, Outside, Double, Navy & Fancy Calipers	33⅓
Sardine Box Openers, Nos. 1, 3 and 4	30
" " Nos. 7, 8 and 9	40
Sardine Scissors	30
Oyster Knives	25
Fluting Scissors and Curling Tongs	25
Curling Irons	40
Gas Pliers	30
Tack Hammers	20
Saw Sets	20
Segar Box Knives	20
Carpet Stretchers	30
Trammel Heads	25
Davis' Duplex Wrenches	35

	8	12	15	18-in.
Change list as follows:	$15·00	$21·00	$30·00	$48 00
Cast Fast Joint Butts				40
Cast Loose Joint Butts				50
Mayer's Hinges				40
Parliament Butts				40
Reversible Loose Pin Acorn Tipped Butts, plain				45
" " " Japan'd and Plated				40

	Dis. per cent.
Mann's Patent Metallic Sieves	15
" " in lots of 25 dozen	20
" " " 50 "	25
Reduce the list 50 cents per dozen on all but No. 30. Delivered only at store or at the factory.	
Patent IXL Wood Saws	20
Meat and Vegetable Chopper	50
Reduce list to $7·50.	
Skates	40
Hand Bells	65&5
Ellis Cards, Leathered	40
" Wood	25&10

IRON.

American Pig.—The large consumers are nearly all either partially or wholly suspending work; and even those who are partially running find great difficulty in obtaining sufficient currency to pay off their hands, so that there is scarcely any inquiry for Pig Iron, while the production still continues in the same ratio as heretofore. Stocks are accumulating of all brands, and there is considerable pressure to realize. Prices in this condition of affairs are weak and decidedly in favor of purchasers. We reduce our quotations, but they must still be considered as wholly nominal, as a prompt cash offer at a material concession from present figures would probably be accepted. We do not hear of any transactions of importance. We quote No. 1 at $40; No. 2, $33·50 @ $34, and Gray Forge, $29 @ $31.

Scotch Pig.—The market for Scotch Iron is at a dead lock, there being no buyers at prices asked by holders. Parties having control of stocks here do not appear to be anxious, and are not pressing their supplies on the market, though it is probable they would shade their views to a prompt cash buyer. The late arrivals are being placed in store. We quote nominally at $50 @ $51 for Coltness, $49 for Gartsherrie, $47 for Summerlee, $46 for Glengarnock, and $45 for Eglinton.

Following are the prices of Scotch Pig Iron in Glasgow, as reported by Messrs. J. E. SWAN & BROS., under date of Sept. 26:

	No. 1	No. 3	No. 4
Gartsherrie	125/	120/	....
Coltness	127 6	116/	....
Summerlee	120/	112/	115/
Langloan	120/	112 6	....
Govan	115/	112	112/
Calder	*117 6	112 6	....
Shotts, Bessemer	160/	155/	....
do Ordinary	122/6	115/	....
Carnbroe	119/	114/	115/
Wishaw	115/	112/	112/
Monkland	115/	112/	....
Chapelhall	120/	....	....
Clyde	115/	113/	112/
Quarter—Clyde	115/	113/	112/

Glasgow Warrants 3-5, No. 1; 2-5, No. 3, g. m. b. 111/6.
*f. o. b. Glasgow, 1/ per ton, extra.

WEST COAST BRANDS—*f. o. b. Ardrossan.*

Glengarnock	120/	115/	..
Ardeer			
Eglinton, Lugar, Muirkirk, Portland	Branded Eglinton	115/	113/ 114/
Dalmellington	118/	115/	110/

CURRENT RATES OF FREIGHT ON PIG IRON.

To	From Glasgow.	From Ardrossan.
New York	7/6	7 6
Boston	17/	17/
New Orleans	20/	20/
Baltimore	17/	17 6
Philadelphia	16/	16/
Providence	20/	15/

Bar.—The market remains very quiet for Refined from store, and prices show little if any change. We quote the price at mill 3·5 @ 3·6 cents per lb.

Old Rails.—We do not hear of any offering or bids, and values are uncertain.

Rails.—There has been some inquiry for new American, but on terms at a wide variance from manufacturers' prices, and not resulting in any transactions of importance. We quote nominally at about $70 @ $75, currency. New English dull and without reported business; quoted nominally, $62 @ $63, gold.

Scrap.—We quote No. 1 Wrought Scrap, from yard, $40 @ $42, and note the sale of 300 tons from yard at $43·50, four months, with interest; 300 tons on dock were offered at $38, cash, without buyers.

METALS.

Copper.—Trade in Ingot Copper continues very dull, and sales limited to such small lots as are wanted to fill pressing orders. The stocks of Copper are very large, and prices weak. Cash buyers are enabled to make their own terms, and reasonable cash offerings are seldom, if ever, refused. Holders generally ask 24½c. for present delivery, but sales, when effected, are from 24c. upward. We note during the past week sales in lots footing up 350,000 lbs., at 24c. @ 24⅝c. the last half, and 24½c. @ 25c. the earlier portion. For future delivery there is scarcely any inquiry, and the value is entirely nominal at 27c. Manufactured Copper continues very quiet, but values nominally remain the same. We quote at 40c. for Bolts and Braziers, 38c. for New Sheathing, 45c. for Nails, 26c. @ 27c. for Old Sheathing, 27c. for Yellow Metal Sheathing, 32c. for Yellow Metal Bolts, and 27c. @ 30c. for Yellow Metal Nails, Sheathing, etc.

Tin.—The market for Pig Tin continues very dull and prices weak and tending downward. Straits have been offered in large lots to arrive during balance of year at 30c., and it is doubtful if they would realize 29c. For small parcels on the spot holders ask 30½c. @ 30¾c. English L. and F. are freely offered at 27¾c., from store and shipment October and November. English refined held at 29c. to arrive, and 29¼c. on the spot. Banca, nominally, 34c. The above prices are all gold values. Tin Plates are also dull and prices tending downward. We quote in gold at $9·75 @ $10 for Charcoal Tin; $8 @ $8·50 for Coke Tin; $9·50 @ $9·75 for Charcoal Terne, and $7 @ $8 for Coke Terne. The following tabular statement from White & Hackett's monthly circular will show the arrivals during September, stocks on hand October 1, and quantity on the way here:

	Slabs.	Tons.
Import in September, Straits	6,883	260
" " English		40

From the East Indies, there are on the way,

	Slabs.	Tons.
Straits	6,584	235
Malacca	4,569	195

due in all October, November and December.

Stocks in importers' and speculators' hands:

	Slabs.	Tons.
Straits	8,417	340
English L. & F.		25
Total, New York and Boston	8,417	365
Against Oct. 1, 1872	7,000	310
" Oct. 1, 1871	1,100	34

Lead.—There was some disposition on the part of holders to realize during the earlier portion of the week, and quite liberal sales were effected at a fraction lower figures for prompt cash. Sales included about 1000 or 1200 tons, principally domestic, at 6¼c. prompt cash, and 7c. for foreign. Later trade has been more quiet, but prices held steadily. We quote at the close at 7c. @ 7¼c. for Spanish and German ordinary; 7c. @ 7¼c. for English; 7¼c. @ 7¾c. for foreign refined, and 6⅝c. @ 6¾c. for domestic, all gold prices. Manufactured Lead continues steady. We quote at 9¼c. for Bar, 10½c. for Sheet and Pipe, and 16½c. for Tin Lined Pipe, less the usual discount to the trade.

Spelter and Zinc.—There is very little doing in either foreign or domestic Spelter, but prices continue steady. We quote Silesian at 7½c. @ 7¾c., gold, according to brand; and domestic plates at 8⅜c. @ 11c., currency. Sheet Zinc is quiet, but steady, at 10c., less 4 per cent., gold, from agents' hands.

Antimony.—The market for Regulus continues quiet, and only small lots being placed at about 13½c., gold.

The following are BIGELOW & JOHNSTON'S prices current and remarks, under date of Sept. 30, 1873:

NEW RAILS.—The financial disturbances of the past month having brought business pretty nearly to a standstill, it is difficult to give accurate quotations. Without doubt any price that might be named would be more or less nominal, as cash buyers would find sellers only too willing to meet them. Buyers for notes and bonds are decidedly at a discount, and their popularity is rather on the wane. It is not easy yet to predict what effect the panic will have on the price of Rails, but it cannot be otherwise than disastrous, judging by the opprobrium which is being cast upon nearly all new railway undertaking.

The sales since our last have been trifling, at about our quoted prices. In Steel there is very little doing.

Foreign Iron Rails	gold,	$63·00 @ 65·00	
American Iron Rails	currency,	70·00 @ 74·00	
Import at N. York this month, tons,			....
Previously since January 1	"		41,449
Total to date	"		41,449
Same time, 1872	"		154,215
Same time, 1871	"		164,823
Foreign Steel Rails	gold,	$109·00 @ 112·00	
American Steel Rails	currency,	120·00 @ 125·00	
Import at N. Y. this month, tons,			7,579
Previously since Jan. 1	"		65,084
Total to date	"		72,663

OLD RAILS.—The demand has been all but extinct, and with the low prices ruling for Forge Iron there is very little probability of any improvement.

Double Heads	currency,	$45·00 @ 46·00	
T or Flange	"	43·00 @ 44·00	
U or Bridge		Nominal	
Import at New York this month, tons,			30
Previously since January 1	"		9,282
Total to date	"		9,312
Same time, 1872	"		49,768
Same time, 1871	"		42,781

SCRAP IRON.—Dull and nominal.

No. 1 Wrought	currency,	$38·00 @ 41·00	

PIG IRON.—There is scarcely enough of business being done to establish a market, but No. 1 American being in comparatively light supply maintains its position better than No. 2, which is freely offered at very irregular figures. In Scotch there was a fair business early in the month, and prices were well supported even during the height of the money crisis. The market is now very quiet, buyers and sellers being apart in their views.

American Forge	currency,	$26·00 @ 30·00	
No. 1 Foundry	"	40·00 @ 42·00	
No. 2 Foundry	"	34·00 @ 36·00	
Scotch No. 1 Foundry	"	44·00 @ 49·00	
Import of foreign this month, tons,			6,870
Previously since January 1	"		44,601
Total to date	"		51,471
Same time, 1872	"		78,290
Same time, 1871	"		62,075

PHILADELPHIA.

Messrs. LLOYD, SUPPLEE & WALTON, 635 Market street, under date of October 7, report as follows: Trade has continued remarkably good during the entire week, and at the present writing we can see but little if any diminution in the same. We cannot say the same in regard to collections, which have fallen off wonderfully during the week. We fear many customers are not doing all in their power to keep up their credit, but in many cases parties have held back when possible, and, even convenient, to pay up due accounts. We have no changes in prices to report since our last letter.

Messrs. BLAKISTON & COX, 333 Walnut street, under date of Oct. 7, report as follows: The Iron trade in this vicinity, in common with all other branches of business, has felt the paralyzing effects of the recent "panic," and the consequence has been an almost entire stagnation of business. Finding, however, that they were not included in the list of "killed, wounded and missing," the iron masters and their customers have again taken heart, and trade has a more buoyant feeling. A careful inquiry into the financial standing of the trade, hereabouts, failed to find any cause for alarm that they would not be able to meet all business requirements. One large house, it is true, has temporarily suspended (owing to large and unexpected demands upon it), but its assets largely exceed its liabilities, and they continue their business as usual. It is also rumored that a house here, largely engaged last year in speculation, has been much embarrassed, owing to *recent losses*, but we are not able to authenticate this. With these, and one or two minor exceptions, the trade is in good credit, and will compare favorably with the best anywhere. Many of the large manufacturing establishments have, from prudential motives, countermanded orders and discharged hands, but much fewer than might have been expected; and, as banks have expressed the determination of helping them to any extent, no embarrassment will result except in the matter of currency for paying wages. We learn, however, that some of the establishments have entered into an agreement with the store keepers, in their several neighborhoods, and are now paying hands in store orders. Wages have been reduced at all the furnaces on the Lehigh from 10 to 20 per cent., and some furnaces, making Forge Iron, have "blown out." Nearly all the large companies are "blowing out" one or more furnaces, and some of the smaller concerns, talk of stopping entirely. Parties with plethoric bank balances, taking advantage of the scarcity of money, have been making purchases during the last week for *prompt cash!* the makers shading their quoted prices to meet these desirable customers. We note considerable sales on these terms, principally for New England. Best brands American Pig Iron are now held at, for No. 1 Foundry, $42; No. 2 Foundry at $34 to $36; Gray Forge, at $31 to $33, delivered here, for time. We notice sale from one of our best mills, of Merchant Bars, at 3 7-10, delivered here. American Rails have sold at $70, for prompt cash, at the mills.

The following is from Edward Samuel's monthly market review:

PHILADELPHIA, Oct. 1.

American Pig Iron is still without movement of note, although in the early part of the month, from the inquiries afloat, a moderately active trade was anticipated. It is needless to say that the present financial panic has entirely destroyed such anticipations. Prices are purely nominal, most of the producers preferring to carry the Iron than take four months' paper, which, in the present condition of affairs, is useless. Would quote nominally for standard makes at furnace, for No. 1, $38 to $40; No. 2, $33 to $34; No. 3, $29 to $30; although we have heard of offerings at considerably lower figures for cash. *Scotch Pig* is in but light stock here, and the demand confined entirely to five and ten ton lots, which have been sold at $50 to $51 for Eglinton. In New York, where the entire stock is in the hands of one or two parties, prices are $51 to $51·50 for Coltness, $50 for Gartsherrie, $47 for Summerlee and Glengarnock, and $46 for Eglinton. *Rails* have been in light demand with constantly receding figures, and the future outlook is anything but promising. Already wages have been reduced from 10 to 15 per cent. at several of the largest works, and unless a change occurs in the market, many of the mills will undoubtedly have to suspend work. American makes are held at about $75 at mills, and $65, gold, is the asking price for English in New York. *Old Rails* are exceedingly dull, with no transactions. Prices are weak, notwithstanding firmness on the other side. Double Heads are held at $49 @ $50; Ts, $45 @ $46. *Merchant Bars* are low in price and dull of sale. In the early part of the month orders were more plenty, the warehouse men having pretty well sold out their old stocks, and desiring to replenish at the exceedingly low prices prevailing. Sales in Pittsburgh for Eastern accounts were reported as low as 2·9 cents, but the majority of orders were placed at 3 cents, at which price it is believed business can be done at present for cash. Regarding the sale of American Bars in Liverpool about the middle of the month, it is undoubtedly a fact that no American Iron could be sold there at the price named without heavy loss, and the transaction was no doubt for the purpose of depressing wages in that country. *Wrought Scrap* is in very scanty supply for prime lots, and in fair demand in small parcels. Sales were made during the month at $45 for superior selections, but about $40 for general lots is a fair quotation. For the past five months there has been a natural and easy decline in the price of both raw and manufactured Iron, which would have resulted in a healthy trade this fall or winter, had the present financial difficulties not occurred. Now, however, the outlook, barring some few specialties in manufactured Iron, is uniformly depressing. The old and new railroad companies, consuming directly about 1,200,000 tons per annum, and indirectly halt as much more, will necessarily be curtailed in their purchases, and this, together with the increased production, will undoubtedly produce a sluggish trade the coming winter, and perhaps require a suspension of production for some months to come. The trade generally has, however, had several prosperous years, and is perhaps in a better position to suspend operations, if needs be, than ever before. The price of labor will no doubt be materially affected, and we look forward to much lower wages for many months to come.

PITTSBURGH.

PITTSBURGH, Oct. 4.—The money panic seems to have been felt more in mercantile and manufacturing circles this week than at any time yet, while among the banks the feeling is reported better. Money, I mean currency, is very scarce, that is, in circulation. The banks, particularly the National banks here in Pittsburgh, are stronger now than they were before the panic commenced, as they have not been discounting, to any extent, and here is where the pinch is. This accounts for the fact that the business public is feeling its effects more sensibly now than at any time yet. Nearly all of our large manufacturing establishments are largely dependent on the banks for accommodations, and the result will be, if these are withheld for any length of time, that many of the former will be obliged to shut. Quite a number of concerns are reported as having discharged a number of their workmen; others have reduced wages, while others, again, have reduced the hours of work from ten to eight hours, and the pay accordingly. A large meeting of our leading manufacturers was held on Friday, 3d instant, at which the situation, present as well as prospective, was pretty fully discussed. It was finally resolved, as the sense of the meeting, if the workmen would acquiese, that they, the manufacturers would continue running their works full force and full time, but, until money becomes easier, on half pay. This is certainly a very liberal and generous proposition on the part of the manufacturers, as the most of them, providing they would consult their own interests, would shut down, and there is not much doubt but the workmen will accept it. The crisis is more critical to the workmen than his employer, as the latter, as a general thing, are better able to weather it through than the former. Many of our manufacturers would save money and a vast amount of trouble and uneasiness by "shutting down" until the panic has subsided, but in order to assist their workmen through they propose to battle away and take the risks incident to times like these. The Pig Iron trade continues very dull, and until money becomes easier no material improvement can reasonably be expected. The demand is very light, being confined entirely to supplying immediate wants, while prices are nominally unchanged, although the fact is there is scarcely enough doing to establish quotations. Some operators seem to be pretty strongly impressed with the belief that the stringency in money will cause a further shrinkage in the value of Pig, arguing that some of the producers will be obliged to realize, and it is certain that if any considerable amount was forced upon the market in the present unsettled condition of affairs, that concessions would have to be made in order to make sales, as consumers would not buy to any extent unless an inducement of this character was offered. There are others, however, equally intelligent and well informed, who contend that Pig was down below the cost of making it prior to the panic, and they argue from this that it cannot go any lower. They claim that every ton that has been sold here recently has been at a loss of from $1 to $2 per ton to the producer, and taking this view of the situation the inference is that if present prices cannot be sustained the furnaces must shut down; there is no other alternative. Choice Gray Forge Red Short Mill Irons are still quotable at $33 to $34, and while no considerable amount could be sold at these figures, we do not think that it could be bought for any less. No. 1 Foundry Irons, $38 to $40; No. 2, $32 to $34; White and Mottled, $30 to $32; Charcoal Irons, $45 to $50 for Warm, and $60 to $65 for Cold Blast. Blooms continue dull, but prices are nominally unchanged, ranging from $95 to $110, according to quality. The demand for finished Irons has, as might be expected, fallen off somewhat; however, the mills are still in operation, some of them running to their full capacity, and, as already intimated, the indications are that they will continue in full blast notwithstanding the financial troubles, which to them is a very serious matter. Some orders have been countermanded for the present in consequence of the buyer being unable to pay for the same, but, as a rule, the mills are all pretty well fixed so far as orders are concerned, as they were largely sold ahead before the panic set in. Prices have undergone no quotable change, and there is no disposition to make concessions; actual selling rates may be fairly given on a basis of 3 and 4-tenths to 3 and 5-tenths for bars—the card remains nominally unchanged. The demand for Nails has also fallen off somewhat, but with light stocks, both in first and second hands, prices are firm and fully sustained; $4·50 with 10⅛ cents per keg off

for lots of one hundred kegs and upward, and two per cent. discount for cash. The following mills are running: Shoenberger's, Graff, Bennett & Co., Zug & Co. Chess, Smyth & Co. stopped temporarily in consequence of an accident to machinery. Lewis, Bailey & Dalzell have suspended temporarily, in hopes of an early improvement in financial troubles. Up to this writing none of the Bar Iron mills have stopped.

The *Commercial*, of the 4th inst., says: We regret our inability to report any improvement in the market for raw Irons. The aspect of financial affairs is, if anything, more gloomy than at date of last report. While it continues as now we cannot expect a revival of demand for Pig metal. It is hoped that some arrangement may result from the meeting of manufacturers held yesterday that will keep our manufactories in operation. The sales made during the week indicate a slight reduction in price. We are reported the following sales:

BITUMINOUS COAL SMELTED FROM LAKE SUPERIOR ORE.

100 tons gray forge	$33 00–4 m.
100 tons close gray neutral	33 00—4 m.
100 tons white and mottled	30 00—4 m.
100 tons gray neutral	31 00—cash
100 tons gray forge neutral	34 00—4 m.
100 tons mottled	33 00—5 m.
50 tons No. 1 foundry	36 00—4 m.
20 tons No. 2 foundry	34 00—4 m.

ANTHRACITE.

100 tons gray forge, C. S	$32 00—4 m.
50 tons cold short forge	30 00—4 m.
30 tons No. 1 foundry, extra	40 00—4 m.
20 tons No. 2 foundry	36 00—4 m.
20 tons No. 2 foundry	34 00—4 m.
20 tons No. 1 foundry	38 00—4 m.

BALTIMORE.

Messrs. WYETH & BROTHER, Iron and Steel merchants, corner of South Charles and Lombard streets, report us the following prices under date of Oct. 7, 1873: Trade rules quiet, with but little disposition to purchase, and that only for immediate wants. Quotation figures are firm, and, as a general rule, strictly adhered to.

AMERICAN REFINED BAR IRON.

1 to 6 wide by ¾ to 1 thick	3¾c. to 4c. per lb.
1 to 4½ wide by 1¼ to 2 thick	" " " "
Round and square, ordinary sizes, from ¾ to 2 inclusive	3¾c. to 4c. "
Hoop Iron, 1½ wide and upward	5¼ to 5½c. per lb.
Band Iron, from 1¼ to 4 in. wide	4¾ to 4¾c. "
Horse Shoe Iron ¾ to 1 wide by ¾ to ¾ thick	5 to 5¼c. "
Norway Nail Rods	8¼ to 8¾c. "
Black Diamond Cast Steel, Flats, Squares and Octagon, ordinary sizes	10¾c. "
Machinery Steel	11½c. "
Cast Spring Steel	11c. "
Homogeneous Steel Plate	13c. "
Perkins' Horse Shoes, per keg of 100 lbs	$6 37½
" Mule Shoes " "	7 37½

Common Horse Nails, from 14c. to 18c per pound.
10 9 8 7 6
Putnam Horse Nails..23 24 25 26 28c. per lb.
R. R. Spikes.....5¼ by 9-16 at 4¾c. to 5c per lb.

BOSTON.

Messrs. MACOMBER, BIGELOW & DOWSE, under date of October 4, write us as follows: The hardware jobbers cannot but be satisfied with their September business, so far as sales are concerned. The profits have been fair, taking everything into consideration, and the prospect is good for an exceedingly active month during October. The New England trade, now coming in to replenish their stocks, report fair activity at home, with light stocks on hand, and should the money market get settled, so as to inspire confidence, their purchases will be fully up to the average. Collections for the last two weeks, very difficult to make, but renewed confidence will regulate this matter in a short time. The outlook is favorable, and nothing but money matters will prevent a much larger business than usual. Prices of leading goods firm, and the feeling is rapidly gaining ground that no more breaks, so disastrous to manufacturers and jobbers, will be made this season. It is certainly a hopeful sign when manufacturers begin to refuse orders at old prices, and as this is the case with some articles, we trust the time is near at hand when their terms will be positive, without seeking the prices of their competitors to make their own terms. That some articles still rule so low is surprising, when it is known for a certainty that they net an actual loss to the maker. We hope that a better time is coming, and a better understanding will be had among manufacturers, and so bring prices nearer their true value. It is not for the interest of jobbers to have these breaks occur, as it unsettles confidence in everything. A firm, hardening market is always satisfactory, and the stoppage in the production of hardware would indicate such a result later in the season.

LOUISVILLE.

Mr. GEO. H. HULL, under date of Oct. 6, writes us as follows: The market is without quotable change, though in consequence of the financial panic there is little doing, and prices must be regarded as nominal. The usual time, four months, is allowed on the quotations below:

HOT BLAST CHARCOAL.

No. 1 F'dry, from Hanging Rock Ores	$48·00 @ 50·00
" 2 " " " "	45·00 @ 46·00
" 1 Forge, " " "	36·00 @ 37·00
" 1 F'dry, from Tennessee Ores	46·00 @ 48·00
" 2 " " "	43·00 @ 45·00
" 1 Forge, " "	36·00 @ 37·00
" 1 F'dry, from Alabama Ores	48·00 @ 50·00
" 1 " " Iron Mountain Ores	50·00 @ 52·00

HOT BLAST STONE COAL.

No. 1 F'dry, from Missouri Ores	45·00 @ 46·00
" 2 " " "	41·00 @ 43·00
" 1 Forge, " " "	34·00 @ 35·00

COLD BLAST CHARCOAL.

Car Wheel from Hanging Rock Ores	60·00 @ 62·00
" " Tennessee Ores	58·00 @ 60·00
" " Alabama Ores	60·00 @ 62·00
" " Georgia Ores	60·00 @ 62·00
" " Missouri Ores	58·00 @ 60·00
" " Kentucky	56·00 @ 62·00

CINCINNATI.

Messrs. ADDY, HULL & Co., under date of Oct. 6, write us as follows: Market quiet, with a very light demand. Prices are held somewhat in suspense, pending a more settled state of affairs in financial matters. Buyers look for a reduction in prices as the result of the panic, but holders are reluctant to take this view, and sustain prices with a moderate degree of firmness.

HOT BLAST CHARCOAL.

Hanging Rock No. 1	$47·00 @ 48·00—4 mos.
" " No. 2	43·00 @ 45·00—4 mos.
" " Forge	35·00 @ 36·00—4 mos.
Tennessee No. 1	44·00 @ 46·00—4 mos.
" Forge	35·00 @ 36·00—4 mos.
Alabama No. 1	47·00 @ 50·00—4 mos.
Missouri No. 1	49·00 @ 50·00—4 mos.
" No. 2	44·00 @ 45·00—4 mos.

HOT BLAST STONE COAL.

Missouri No. 1	$46·00 @ 47·00—4 mos.
" Forge	35·00 @ —4 mos.
Ohio No. 1	42·00 @ 44·00—4 mos.
" Forge	34·00 @ 35·00—4 mos.
Scotch Pig, No. 1	

COLD BLAST CHARCOAL.

Hanging Rock Car Wheel	$60·00 @ 65·00—4 mos.
Missouri " "	60·00 @ 62·00—4 mos.
Kentucky " "	58·00 @ 60·00—4 mos.
Tennessee " "	58·00 @ 60·00—4 mos.
Georgia " "	60·00 @ 63·00—4 mos.
Alabama " "	60·00 @ 63·00—4 mos.
Machinery and Forge	58·00 @ 60·00—4 mos.
Blooms	112·00 @ 115·00—4 mos

FOREIGN.

GREAT BRITAIN.

Messrs. J. Berger Spence & Co., London, Glasgow and Manchester, under date of Sept. 27, 1873, report:

Metals—An uneventful week has been passed in this market, orders to a moderate amount are coming in, and there has been no material alteration in values. A slight reduction in the price of Scotch Pig Iron Warrants has been followed by a large increase in business, and it appears probable they will soon revert to their original standard. The shipments for the week ending the 20th inst. amounted to 8364 tons, against 14,018 tons in the corresponding week of 1872. The stock of Pig Iron in store at Glasgow is now about 42,000 tons, against 107,000 tons on December 25th, 1872, and 373,000 tons on the same date in 1871. There is a slackening in the demand for Middlesborough Pig Iron, but smelters generally being well sold are not inclined to meet this by any considerable reduction in quotations. Although the orders for Manufactured Iron do not come up to the average, the falling off is principally in second-class brands, and makers of first-class qualities are almost all fully occupied. In Copper there is not much doing, and prices are easier alike for English Tough and Manufactured and Chili Bars. Cable advices are to hand advising that the charters from the West Coast for the fortnight ending on the 2d inst. amount to 3400 tons. Tin is steady. Lead is still looking up, and the high prices at which ores are selling must tend to keep up the value of this metal. Sales of Spelter have been made at rather lower rates, but the stock being small they may be considered exceptional.

IRON—"Ayresome" Yorkshire Pig Iron, No. 1, 105/6; No. 2, 102/6; No. 3, 100/; No. 4, (Foundry), 98/6; No. 4 (Forge), 97/6 net cash, or 2/ extra 4 months' bills. Scotch Pig, warrants, 109/6 to 110/. Staffordshire Bars, £12. 10/ to £14. Hoop Iron, £13. 10/ to £14. Gas Tubes, 47½ per cent. off new list. Boiler Tubes, 17½ per cent discount.

COPPER.—English Tough Ingot, £92 to £95. Chili Bars, £83 to £85.

TIN.—English Ingot, £128 to £129. Straits, £126 to £127.

TIN PLATES.—Best Coke, I. C., 34/ to 39/; Charcoal, I. C., 40/ to 44/ per box.

LEAD.—Best English Soft Pig, £23. 15/ to £24. Refined Red Lead, £25 to £27.

ANTIMONY.—French Star, £59 to £60

SPELTER.—Silesian Special Brands, £27 to £27. 10/. English, best Brands, £27. 10/ to £28..

IMPORTATIONS.

Of Hardware, Iron, Steel and Metals into the Port of New York, for the week ending October 7, 1873:

Hardware.

Althof, Bergmann & Co.
Cases, 1
Alburtus G. W.
Packages, 7
Bodenheim, Meyer & Co.
Mdse. pkgs., 5
Cases, 5
Boker Hermann & Co.
Arms, cs., 16
Cases, 1
Casks, 20
Mdse. pkgs., 13
Beam & Murray,
Chains, cks., 38
Bruce L. R. & Co.
Cases, 1
Campbell H. P.
Casks, 21
Cooke Jay & Co.
Cases, 5
Carlyle W. A.
Cutlery, cs., 1
Drexel, Morgan & Co.
Files, cks., 1
Field A & Co.
Packages, 48
Frasse P. A. & Co.
Mdse. pkgs., 3
Folsom H. & D.
Per. caps, cs., 5
Hildick A. H.
Chains, cks., 11; pcs, 15
Mdse. cks., 1
Anvils, 95
Harmar Wm. & Co.
Packages, 7
Harmar, Hayes & Co.
Mdse. pkgs., 3
King, Briggs & Co.
Cutlery, cs., 3
Lang W. Bailey & Co.
Wire, bxs., 19
Laughland & Co.
Wire, cks., 5; bdls., 810
Many F. L. & Marshall,
Chains, cks., 1
Mason John W. & Co.
Wire rope, coils, 17
Moore's J. P. Sons,
Guns, cs., 2
Per. caps, cs., 2
Russell & Erwin Mfg. Co.
Files, cks., 3
Robbins C. & Son,
Cutlery, cs., 1
Sawyer John.
Wire rope, coils, 1
Seaman H. A. & Bro.
Curry combs, cs., 1
Cases, 1
Shaw J. M. & Co.
Cases, 3
Vom Cleff Bros.
Mdse. pkgs., 7
Van Wart & McCoy,
Mdse. pkgs., 1
Packages, 6
Cases, 6
Casks, 1
Van Nest A. R. & Co.
Cases, 2
Western Union Tel. Co.
Galvanized wire, lots, 533
Witte John G. & Bro.
Mdse. pkgs, 45
Ward A.
Mdse. pkgs., 2
Wiebusch F.
Mdse. pkgs., 18
Anvils, 259
Chains, cks., 20
Order.
Files, cks., 19
Chains, cks., 39
Casks, 13
Cases, 4

Iron.

Aukers J. Henry,
R. R. ties, 462
Scrap, tons, 2
Brown Bros. & Co.
Bars, 2106
Crocker Bros.
Pig, tons, 334
Congreve Chas. & Son,
Rails, 883
Fish plates, bdls, 1000
Darrell & Co.
Scrap, cks., 5; pcs, 17
Griswold J. A. & Co.
Pig, tons, 100
Holdane J. H. & Co.
Flues, 500
Henderson Bros.
Pig, tons, 350
Harrison W. G.,
Scrap, lots, 1
Irwin R. & Co.
Pig, tons, 200
Lang W. Bailey & Co.
Bundles, 60
Bars, 332
Laughland & Co.
Haybands, bdls., 12
Mallory C. H. & Co.
Scrap, bags, 10
Morton, Bliss & Co.
Rails, 492
Naylor & Co.
Fish plates, bdls., 633
Bundles, 1758
Coils, 231
Bars, 3368
Swedish, bxs., 600
Oelrichs & Co.
Casks, 160
Whitney A. R. & Bro.
Bundles, 88
Order.
Rails, 2278
Bars, 3425
R. R. bars, 1386
Fish plates, bdls., 298
Sheet, pkgs., 6
Cotton ties, bdls., 9000
Pig, tons, 360
Scrap, tons, 4

Steel.

Alexander E. L.
Bundles, 82
Brown Wm.
Cases, 40
Bundles, 197
Hogan John,
Coils, 58
Bundles, 47
Cases, 29
Hugill Chas.
Cases, 13
Bundles, 4
Kennedy J. S. & Co.
Tires, 40
Lang W. Bailey & Co.
Bars, 200
Moore Henry,
Casks, 6
Nordlinger H. & Co.
Bundles, 256
Naylor & Co.
Cases, 58
Tires, 76
Axles, 56
Bundles, 10
Pearce Chas.
Cases, 45
Van Wart & McCoy
Bundles, 508
Order.
Cases, 11
Bundles, 775
Bars, 55
Bessemer rails, 865

Metals.

Baring Bros. & Co.
Lead, pigs, 3000
Coe & Co.
Scrap, brass, bbls., 36
Dickerson J. S. & Co.
Tin plates, bxs., 2467
Darrell & Co.
Scrap, copper, cks., 3
Scrap, brass, cks., 3; pcs., 1
Lead, bbls., 19
Eggers & Heinline,
Scrap, cks., 4
Hartun H.
Lead, pigs, 2000
Hagemeyer & Brunn,
Scrap, cks., 13
Jex Wm.
Scrap, copper, pkgs., 3
Naylor & Co.
Tin plates, bxs., 825
Phelps, Dodge & Co.
Tin plates, bxs., 12,761
Tin, ingots, 1200
Rivera J. de & Co.
Scrap, copper, pkgs., 49
Salomon A. H. & Co.
Copper, bxs., 1
Schuyler, Hartley & Graham,
Zinc, bxs., 8
Copper, bxs., 15
Shepard Sidney & Co.
Tin plates, bxs., 4.6
Order.
Lead, pcs., 2058
Tin, slabs, 1428; ingots, 1690
Tin plates, bxs., 15,984

FRANCE.

(*Le Commerce.*)

PARIS, Sept. 25, 1873.—The European coal position may, at the present juncture, be described pretty much as follows: France is firm, but there is a good deal of hesitation to lay in extensive supplies on the part of large consumers. Belgium shows great firmness, not to say stiffness; in the Sarre, as well as in the Ruhr country, in Germany, a slight appreciation in values is noticeable, and in England we have a gradual rise in domestic coal. The general outlook is a favorable one for general coal production in Europe, but it will, nevertheless, be necessary to make concessions during the first quarter of 1874, in order to encourage a revival of general metallurgical industry. The European iron situation may be sketched in outline as follows: The general aspect is disheartening, inasmuch as it rests on a contradictory and ill-defined basis. Thus England, after quite an improvement in values, recedes into a state of apathy. In France there is a decided looking up, though moderate in proportions as yet, and we trust it may prove of longer duration than the spurt in England. Belgium, so far as its domestic field of activity is concerned, is far from being satisfied as to prospective briskness, and more especially bases its hopes upon a large export to Germany. We apprehend no serious complications in France in financial circles to result from the momentary dead-lock at New York in monetary affairs, and hope no additional stagnation is feared in metallurgical matters from any such cause. In Germany and Austria the financial and industrial atmosphere was purified during and subsequent to the Vienna crisis, and we apprehend no evil consequences in sympathy with America, with the sole exception of the Berlin building society speculation, which, we presume, will have to pass through a deal of embarrassment.

(*Moniteur des Interets Materiels.*)

PARIS, Sept. 21, 1873.—*Iron.*—A slight improvement in the iron trade is looked forward to with some confidence during the coming month or two. The firmness of prices is thus sufficiently explained. These expectations of a better time coming have, more especially, reference to Iron and Steel Rails, and to all sorts of Wrought and Cast Iron for railroad purposes. Quotations in the Champagne and other Iron regions of France have undergone no alteration, and it would be useless to recapitulate our recent quotations. *Copper.*—Although the money market is not yet perceptibly affected by the panic at New York, the firmness in Copper, alluded to in our last, is not sustained, and the general tendency of the metal has become one of hesitation and wavering. London is quiet and lower. Stock of Copper at Liverpool in first and second hands, 21,400 tons pure Chili and Bolivia, against 20,800 in 1872, and 17,200 in 1871. A large business was done at Paris, ere the New York telegrams came to hand, on the basis of 240 francs for Chili ingots. Nothing doing at Harve, Marseilles remains firm. Germany has been tranquil, and orders have been filled with ease. Berlin has been firm at 50⅝ to 51⅜. *Tin* has been heavy everywhere, and in order to effect sales holders have had to shade prices; but even these concessions have been unproductive of greater activity; with difficulty have a few tons been realized at London. At Liverpool also great indifference. At Paris a decline has been consented to, and we are down to 355 with Banca. Marseilles bears up well. Holland is weak and declining, and nobody can tell what the upshot of the sale on the 25th may prove. September was ushered in with the following stocks of Tin in and afloat for Europe:

	1873. Tons.	1872. Tons.
Straits at London	1,840	1,750
Banca in Holland	690	670
Billiton in Holland	490	370
Straits afloat	420	780
Billiton afloat	560	480
	4,000	4,050

Certainly, no great change in the available supply, while the value of Tin was 14 guilders lower in 1873. Every two months 30,000 slabs Banca will now be sold. This much we know, and as for the rest, the metal will turn upon the Straits and Australian arrivals at London. The whole course of prices has been an almost unchecked decline since the summer of 1872, coming down from 96 to 78 guilders. The slightest serious improvement with an undisturbed money market would send prices up again, moderate as they are; but with the panic at New York, we have to be prepared for the reverse of quiet times in European finance for a month to come. Germany is quiet. No change can be noted in *Lead*; firmness prevails, and we should undoubtedly rise if the general outlook of political and financial affairs were more reassuring. London is not over active, but whatever arrives is bringing full prices. Paris is firm at 50 for French and Spanish, and at 57½ for Belgian and German. Marseilles well upheld at 53¾ to 54¼. Stocks throughout Central Europe are extremely light. *Spelter* has relapsed into greater inactivity, and is weak once more at London and quiet at Liverpool. Paris, 72 for Silesian, deliverable at Havre; other brands here, 71. Marseilles has varied little. Germany without much doing, but generally firm. *Coal*—The situation is decidedly an overdrawn one, and we should decline but for the anxiety of consumers to lay in a winter supply, and their apprehension that transportation may, after a while, not work to satisfaction.

GERMANY.

(*Borsenhalle.*)

HAMBURG, Sept. 19, 1873.—*Metals*—On the whole, inactive. *Lead* is sustained at 25 to 26 for German, 26·30 to 26·50 for English, while not a pound of Spanish is making its appearance anywhere in the market. The sales of *Copper* from first hands are but moderate. From the United States 18,000 pounds have been received, and await a purchaser. Northern sorts are 96 to 105. *Tin* is quiet. Banca, 1·50; English, 1·40 to 1·42½; Rods, 1·42½ to 1·45. *Spelter* is firmly sustained, but nothing transpires. We quote the same, 27½ marks.

(*Frankfort Zeitung.*)

FRANKFORT, Sept. 20, 1873.—The energy and inventive spirit of the people of the United States has ever been bent upon saving labor; up to within the last five years there was no great necessity for our doing so in Germany. Since then emigration and war have withdrawn thousands upon thousands of laboring men and mechanics, while industry has, with increasing prosperity, gone on expanding among us, and wages have appreciated with a wonderful rapidity. We have thus been impelled to tax our ingenuity for the saving of labor as much as the Americans have done for the past thirty years. But we find that we are compelled to tax it still further for the saving of coal. While in the United States coal is abundant in every imaginable variety, the reverse is the case in Europe generally. Hence late inventions made and introduced in Germany in machinery have this two-fold aim. The greatest development observable in Germany, and Central Europe in general, has been for the past fifty years in the direction of metallurgical production on the one hand, and in textile industry on the other, and activity in these branches has concentrated in the Rhenish provinces and Westphalia, in Saxony and Alsace. The progress there within the past five years has been astonishing, when we come to consider that war and a great political transformation have engaged our labors, all our energies and a large portion of our men in the prime of life on other fields than those of peaceful, industrial occupation. While in 1866, a year previous to the Paris exhibition, Germany had to import in excess of its exports 82,000 cwts. of machinery, our export of the same exceeded the import in 1872 by 100,000 cwts. While we cheerfully acknowledge that the great Anglo-Saxon nations, England and the United States, have been our masters and teachers till within the past five years, with the exception of some half a dozen branches of manufacture in the machinery line, we have been and are accomplishing great things since. The Vienna exhibition has abundantly proved it, and so do the statistics at hand. While laying prostrate the most warlike nation of Europe, and financially crippling it for a century to come, we have materially advanced in the manufacture of steam engines, first introduced into the country in 1820, in the Rhenish provinces, in connection with mining industry. Next to it we have gas-power machinery, to assist smaller industrial branches and for the saving of coal, more extensively manufactured, and quite a variety of mining machinery. From Augustus Borsig's locomotive manufactory, founded in 1840, at Berlin, this specialty has spread to eleven cities, now active centers, which jointly turn out upward of 1000 locomotives, representing 17,000,000 thalers, and 30,000 railway cars, to the amount of 30,000,000 thalers annually. The power of our locomotives has been trebled, and we can reduce fares despite higher coal and wages.

FRANKFORT, Sept. 23, 1873.—*Railroad Progress.*—The first railway was thrown open to the public in England in September, 1830, and soon after in the United States. In 1871 the following extent of roads in operation was officially reported from the various European countries:

	Kilometers.		Kilometers.
Prussia	11,850	Spain	5,328
Rest of Germany	8,130	Portugal	700
Austria	11,899	Denmark	876
England	24,749	Sweden	1,836
France	17,660	Norway	492
Belgium	3,041	Russia	13,950
Holland	1,616	Turkey	780
Switzerland	1,471	Roumania	925
Italy	6,378	Greece	10

together 112,034 kilometers, representing a capital of 11,350,000,000 thalers, to which there will have to be added in Asia, 8731 kilometers; in Africa, 1800; in the United States, 109,961, and in Australia, 1900, representing altogether an extent of 234,416 kilometers, and an amount invested of 16,995,341,000 thalers. On the 1st of July, 1873, the aggregate extent of railroads on our globe amounted to 250,000 kilometers, or 19,000,000,000 thalers.

HOLLAND.

(*Wm. Brummer, Schroder & Co.*)

ROTTERDAM, Sept. 20, 1873.—*Tin*—The market for Banca has been quiet, and transactions have been restricted to a few straggling "future" sales from the impending government sale, at 77 to 77¼ guilders, and of Billiton at 75¾.

BELGIUM.

(*Cote Libre.*)

BRUSSELS, Sept. 20, 1873.—*Iron.*—The Acoz, Thy-le-Chateau and Couillet works have undertaken to furnish 20,000 tons of Rails, part this year and part the next. Prices are known to be moderate under this contract, but it will at least keep them busy. Pig Iron is lower at 109 to 110; Wrought Iron, 250 to 270, with a feeble inquiry except for specialties. Sheet Iron is 350 francs per ton. The general aspect is far from brilliant, and will remain rather dismal as long as coal keeps at current exorbitant rates. Fortunately Germany will take off our hands during the winter all sorts of railroad materials and rails. *Coal.*—Both Charleroi and Mons report firm prices and a fair degree of activity, yet we are all aware that iron industry is not in the market with large commands, and glass manufacture less still; but we readily admit that the approach of winter stiffens coal prices periodically at this advanced season. The Couchant de Mons, during the first six months of 1873 has shipped 1,527,623 tons of coal, against 1,670,759 in 1872, a decrease of 113,116 tons, which has been made up from England and the Ruhr country.

EAST INDIES.

(*J. Peet & Co.*)

BATAVIA (Java), Aug. 16, 1873.—*Tin*—According to the official statistics at Banca, the stock there was 54,128 piculs, to which there will have to be added receipts for the second quarter of 2983 piculs, constituting a total supply of 57,111. Shipments from Banca to Java during the first six months, 10,482 piculs, leaving a stock of Tin at Banca of 46,629 piculs on the 1st ult. On the 4th inst. 900 piculs Billiton sold at an average of 85·46 guilders, equal to £127. 10/ per ton laid down in Holland.

(*Clark, Spence & Co.*)

COLOMBO (Ceylon), Aug 23, 1873.—*Plumbago*—There is nothing doing for the United States, although there is still a quantity of Lead waiting opportunity for shipment to New York. The Magdala sailed on the 10th inst. for New York with 409 tons Plumbago. Prices are somewhat lower since our last report. Respecting the rates likely to rule for the new season, much will depend on the course prices take in the consuming markets during the next couple of months, and the orders that may be received here in the interval. Should there be a scarcity of orders and any considerable fall in rates in the consuming countries, prices here may be expected to be lower, but, at the same time, this would greatly restrict production, which has been increased so largely under the stimulant of the high rates of the past year. Probable September shipments to New York, 400 tons. Excess of shipments to the United States from Oct. 1, 1872, to date, 2847 tons. Lumps, 493 6, free on board.

SOUTH AMERICA.

(*H. Fischer & Co.*)

VALPARAISO, (Chili), Sept. 2, 1873.—*Copper Bars.* Unfavorable European accounts caused holders after the last mail had left to lower their asking rate to $17¾ per quintal from Coquimbo, and to $17½ from here, at which prices whatever appeared has been promptly taken. There has been a rather active demand for Copper, with a secured freight per steamer, and lots have been placed at $18·02½, with 60/, and at $18¾ with 50/ freight, at which a steady inquiry continues. Regulus and Ore are wanted at low prices only, two cargoes being taken at $7·32½ and $2·97. Sales of Bars, 13,245 quintals; Regulus, 16,500, and Ore 14,000. We quote to-day Bars on shore here $17½, and at Guayacan and Lota, with 50/ freight per steamer, $18¾ on board, asked. Regulus, 50 per cent., $7·32½ on board. Ore, 25 per cent., $2·97 per quintal.

British Iron Exports.

The *Iron Trade Circular* says: We have heard so much of late of the decline of the great staple industry of this country that it may be interesting to study a few figures that tell of facts not to be disputed. There can be no doubt that there has been a very serious falling off in the American demand, and yet we think it will be admitted that the unconcern of the British iron masters thereat has some excuse in the facts that follow. We take the figures relating to our export trade during month of August and the eight months then ended, and, eliminating the United States, we thus have an account of our export trade with the rest of the world. Thus in the month of August this year we exported to other countries than United States 71,520 tons of pig, as against 108,331 in the same month of 1872, and 94,925 in August, 1871. In the eight months just ended we exported 733,958 tons, against 776,976 tons same time last year, and 560,155 tons in 1871. There is unmistakable progress here, and there cannot therefore be a doubt that, had the price of pig iron this year been somewhat less, we should have had as marked an increase over the eight months of 1872 as over the same period of 1871. Of bar, angle, bolt, and rod we exported, still to other markets than the United States, in the month of August, 21,656 tons, as against 23,858 tons in 1872, and 28,336 tons in 1871. Considering the very high prices that have prevailed there is here very little to complain of, and there is even matter for congratulation in the fact that, for the eight months just ended, our export of this item exceeded by some 6000 tons the quantity exported in the same period of 1872. The figures are for the eight months ended 31st August, 1873, 176,142 tons; for the same period ended August, 1872, 170,388 tons; and for the eight months of 1871, 184,352 tons. Coming to railroad iron, the item which of all others in the eyes of the ignorant has most emphatically marked the downfall of our supremacy, we learn that the exports of the month and of the eight months, alike, are largely in excess of what they have been these three years past. Last month we exported 66,969 tons of railroad iron, elsewhere than to the United States, against 54,977 tons in August, 1872, and 50,376 tons in August, 1871. So that here there has been a steady increase. The figures for the eight months are—for this year 358,125 tons, for last year 287,266, and for 1871, the previous year, 327,679, so that the first eight months of this year, notwithstanding all the drawbacks in regard to high prices, actually show a larger export trade than 1871, a year of comparatively low prices. The next item, hoops, sheets, and boiler and armor plates, shows a slight decline on the month, but a substantial increase on the eight months. The figures are as follow: For the month of August, 1873, 13,305 tons; for August, 1872, 15,042 tons; for August, 1871, 15,244 tons. For the first eight months of this year, 134,829 tons; for the same period of 1872, 110,192 tons; and for the same period of 1871, 99,028 tons. We next come to cast or wrought and all other manufactures except ordnance unenumerated. We find here, too, the same highly favorable state of affairs. Last month, leaving out the United States, we exported 23,267 tons, against 21,553 tons in August, 1872, and 21,844 tons in August, 1871. During the eight months just ended, we exported 181,676 tons, against 164,927 tons in the same period of 1872, and 150,544 tons in 1871. Here, it will be observed, there is a steady increase, and this in spite of the prevailing high prices. It would seem that if prices were but a little easier, we should from these sources alone be able to maintain a very good trade, for from these figures it is but reasonable to conjecture that our produce would be welcomed much more largely if it could be had more cheaply. We have but one more item, and that a small one, from which we have taken the United States, and that is steel unwrought. Last month we sent out 1735 tons, against 2047 tons in August, 1872, and 1707 tons in August, 1871. In the eight months just ended, we exported 13,493 tons, against 13,563 tons in 1872, and 10,496 tons in 1871. Of course, it must be remembered that Russia is buying regardless of the price to be paid, and Germany is doing very much the same, and yet it must also be remembered that we have not excluded from these calculations British North America, who seems to be buying as little as possible. On the whole, including the United States, we have done much less export trade than last year, and it is certain that the high prices are shutting us out of that market, but the decline to that quarter of the globe by no means represents an equal decline in other parts of the world, as is shown, we think, by the figures just noted. It will be seen, however, how necessary some reduction in prices is when we regard the falling off to the United States as permanent and not temporary, and are thus led to look around for other customers less enterprising than the United States, and less likely, therefore, to pay high prices. American capacity of production has been steadily on the increase for many years, but it has not yet, and will not in our opinion for many years to come, meet the home demand, much less any foreign requirements, and hence it must come to us for something. The truth is that the iron trade of America is only just in its infancy, and the development of the United States has only commenced. In a few years we shall not be surprised to find her native resources, though they may be double what they now are, altogether inadequate to meet the native demand, and hence we expect to see large order sheets from that country once more. In the meantime we must make the best of what markets we are most in sympathy with, and not overtask them with high prices.

Explosion in a Foundry.—A dispatch from Pittsburgh, bearing date of the 6th inst., says: An explosion occurred this afternoon at William Smith & Sons' National Pipe Foundry, in this city. The men were engaged in casting a thirty-six inch pipe for the water works of this city, when some water came in contact with the molten metal, and a terrible explosion followed. Several men were severely burned by the hot metal, which flew in all directions. Immediately following the explosion, the foundry took fire, and was saved with difficulty. The loss is stated by Mr. Smith to be about $60,000; fully covered by insurance.

Saw Mill Refuse as a Blast Furnace Fuel.—The Menominee *Herald* has the following: A furnace for the manufacture of pig iron with charcoal made from slabs and edgings from saw mills, was built here last winter, and is now in active operation, proving a perfect success from the time it went into blast, which was some three months since. The furnace is 9 feet bosh, and is now making over 130 tons of iron per week, at a consumption of about 135 bushels of coal to the ton of iron made. There has not probably been 100 bushels of hard wood coal used since the beginning, and fully nine-tenths of that consumed was made from the mill refuse. This arrangement has produced the double effect of not only utilizing a waste material, but is saving our mill men considerable sums heretofore expended in getting rid of their surplus, while the furnace is probably making iron cheaper than any other in the Northwest.

Our English Letter.

Review of the British Iron, Steel, Metal and Hardware Trades.

(*From our Regular Correspondent.*)

SHEFFIELD, Eng., September 23, 1873.

Contrary to my usual custom, but in compliance with what I do not doubt will be the natural desires of your readers, I shall give the place of honor to opinions of the British press, on the question of importing American made iron into Great Britain. As your readers are already in possession of the facts of the case, I will merely give you some idea of what the newspapers have had to say upon the subject—only remarking that nothing in the way of an exchange of commodities between two countries, since the famous importation of tea into Boston, has created so profound a sensation. You will find the extracts interesting reading:

Iron, a metropolitan trade journal, writes after this fashion: "It is not often that a quotation from an iron trade circular is advanced to the dignity of a sensational piece of news, which, for the moment, arrests the attention of a public fed to satiety with the Tichborne case. Yet the American mail, arriving this week, has brought intelligence of a transaction in the iron market which, in circles far outside those ordinarily moved by fluctuations in the price of bars and rails, has created a profound sensation. The distinguished paragraph is that which briefly announces the offer to a Liverpool firm of 100 tons of American bar iron, guaranteed equal to Staffordshire bars, and at a price ten shillings below the prices current of the latter. There is no question of the fact, the shippers being

Messrs. Jackson & Chace, of New York, and the proposed purchasers Messrs. W. S. & N. Caine, of Liverpool, and the contract stipulating that the bars shall be 'delivered on the quay in Liverpool at £11. 10 per ton, sterling money, less 2½ per cent., the iron guaranteed equal to Staffordshire bars.' The market, however, has since risen in America, and this firm cannot at present deliver at the price; yet this incident, as indicating not simply that America has ceased to be a market for English iron, but that America is prepared to send coals to Newcastle, has made a great impression on the public mind, although its importance has been overrated. Everybody knows that one swallow does not make a summer, and English ironmasters and merchants well know that the offer of 100 bars of American iron to a Liverpool dealer does not imply the flooding of the English market with transatlantic metal. The total product of the American furnaces is not over two and a half million tons a year, and what is that amongst so many home consumers as the States show? For some months past trade across the water has suffered extreme depression, and the construction of railways has received a severe, though only temporary, check. But trade in America is showing signs of renewed activity with the approach of autumn. More railways will be wanted, especially in the great grain growing districts; and with their projection, and with concomitant demands, the slackened inquiry for home-made iron will tighten to a degree that will not only prevent farther exports to England, but will once more set in motion the erewhile great flow of iron from this country to the United States.

"Practical men will thus take the great news *cum grano salis;* but they will none the less acknowledge its serious import. The mere fact of the offer of a hundred tons of iron from America to Liverpool is more eloquent than a page of commentary on the existing state of the English market, meaning as it does that not only can America produce and manufacture iron, but that, after paying the cost of freight across the Atlantic, it can afford to offer at 10/ a ton cheaper than the Staffordshire manufacturer can deliver it in Liverpool. Nor is the incident an isolated one, though it has come before the public like a thunderbolt. The contract which Messrs. Caine offered to accept from Messrs. Jackson & Chase is the second upon the same terms that has been proposed within the last two months, an incident which goes to show that the first, which was accepted, was at least satisfactory. Further, we hear of two firms in Pittsburgh who are manufacturing steel boiler plates for customers in Ireland; and Lake Superior has, during the present year, shipped a thousand tons of charcoal iron to the mother country. Canada is also being 'annexed' in a startlingly complete manner. A firm in Buffalo has, during the current year, sent 7000 tons of American iron to a single customer in Canada; Cleveland and Pittsburgh also largely supplying the Dominion with our staple. In another branch of production, closely allied with the iron trade, and in which, like the iron trade, England has hitherto flattered itself it held the monopoly, the United States are beginning to walk by themselves. For twelve years past America has been content to take her iron ships out of our yards, and the Clyde has been resonant with the noise of British hammers making ships to sail under the stars and stripes. To-day America is not only making iron ships for herself, but is proposing to come into the iron market and compete with English builders. This is the aggressive action of America in respect of the British iron trade."

Then follows *Jupiter Junius*, as our newspaper wags have named the London *Daily Telegraph* (edited by Edwin Arnold, son of the great Dr. Arnold), a paper boasting "the largest circulation in the world." It says:

"It would appear that the long threatened invasion of our home markets by Pennsylvania iron, in successful competition with English, has at length commenced. That journal states that 100 tons of American bar iron, guaranteed equal to Staffordshire, have been sold to a Liverpool firm at £11. 10/ per ton, delivered in the port, thus underselling the English manufacturer. If this is not an exceptional transaction, and if it should yield a profit sufficient to open up an altogether new trade, then the fact is serious enough in all conscience, and the consumption of champagne by our colliers and puddlers had better be abridged at once. But, remembering what a large amount of unnecessary alarm and of futile discussion was aroused early this year by the talk of an import of Belgian coals into our eastern counties, and how speedily the threatened competition from that quarter evaporated, we must pause ere we admit that the Liverpool transaction marks a staggering blow at our long unquestioned metallic supremacy. Although our workingmen are doing a great deal to make the rivalry of foreigners profitable, we greatly doubt whether they have yet turned the scale so completely in favor of Pennsylvania as to give the latter the least chance of beating us in our own markets. We are fortified in this view by an unimpeachable authority within that flourishing State. Mr. Morrell, one of the members of Congress, an eminent advocate of protective tariffs, and the president of a great iron company, who has been recently 'interviewed' on the subject, has, it seems, expressed an opinion that, while the situation is very promising for the Americans, it is not nearly so desperate for the English ironmasters as they appear to think. He considers that England must long retain the position of the leading iron manufacturer of the world, because it will take a long time to accumulate the capital and facilities for manufacturing that would enable Americans to excel her. Nevertheless, and allowing this opinion to be satisfactory as far as it goes, it would be only prudent in us to recognize the warning given.

"It is not enough that we should be the leading iron manufacturers of the world; we might occupy that position even after losing half our present trade. We cannot afford, with our existing scale of expenditure on production, to lose a single market; and without reference to home consumers, who can surely be supplied by ourselves on at least as moderate terms as Pennsylvanians can offer, it should be enough to know that the Americans are gradually excluding us from the United States, with every prospect of equal success over the whole of the Western continent. Mr. Morrell may think that even after such a loss we shall be 'the leading iron manufacturers of the world.' But we want something more; we want to maintain our late level, if not to advance. The facts now coming to light, however, indicate that, unless we manage to reduce the cost of production very materially, we shall actually fall behind."

The *Echo*, a London evening paper, cleverly conducted by Arthur Arnold, also a son of the famous Doctor, and brother of the editor of the *Daily Telegraph* (both being authorities on social politico-economical subjects), in the course of a leading article says:

"We hope these facts (the sale of bars to Messrs. Caine), will receive from those who guide the counsels of the working classes of this country the attention to which they are eminently entitled. In saying this we have no intention to condemn strikes or to imply that workmen should not combine to raise wages. On the contrary, we admit most freely that they have a perfect right to a fair share of the profits in the production of which their labor is so indispensable an element. But, at the same time, no persons are more interested than trades' unionists themselves in the prosperity of our industry. And it is clearly, therefore, the duty of their leaders to weigh well with themselves how far they can venture to push their claims in view of the extraordinary vigor of the American iron trade. On the other hand, however, employers are equally interested in the retention of our trade, and, consequently, it is no less obligatory on them to meet the demands of their men in a conciliatory spirit. It is neither good sense nor good policy to expect one side to make all the sacrifices while the other side pockets the best part of their profits. And, therefore, if England is to retain her pre-eminence as a manufacturing and commercial country, it is incumbent on both masters and men to discover some mode of working together that will preserve the prosperity of this common country."

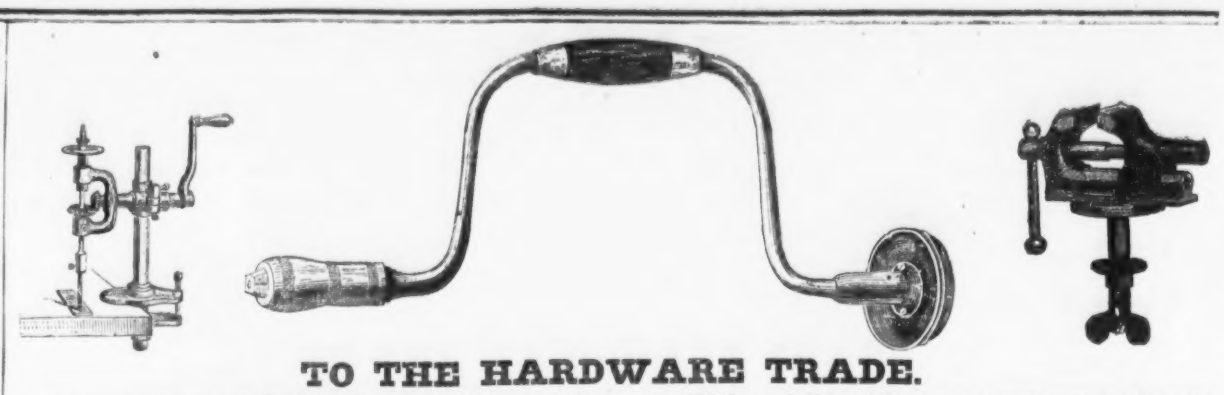
The London letter of the Liverpool *Post*, of Sept. 19, contains the following passage, the latter part of which demonstrates the great interest taken in the question by the merchants and others who "most do congregate" on the London metal market:

"The threatened competition of American ironmasters with those in this country has thoroughly aroused the trade. That this country would lose the whole or the greater portion of the American orders when the producers on the other side obtained facilities in transit and had developed their properties, has long been the opinion of many competent authorities; but the fear has never been seriously entertained that we can be beaten in our own market. The iron masters and brokers heard, with no little surprise a few days ago, that Messrs. W. S. & N. Caine, of Liveroool, had concluded a purchase, and had already received from America iron equal to the best Staffordshire, at a price 10 per ton below the rate current on this side of the Atlantic. If the statement had been correct, and the transaction on the part of the American firm could have resulted in profit to them, the importance of the matter to this country could not have been exaggerated. The letter of Messrs. Caine, however, clears up all doubt which may have existed, and the firm deserve very great credit for having so promptly placed the public in possession of the true facts of this reported invasion of one of our most important markets, and of alleged loss of *prestige*. The letter of Messrs. Caine of to-day was posted at the headquarters of the metal trade, viz.: the Lombard Exchange, and at other commercial centers, and was eagerly read by the interested groups of subscribers who thronged the rooms, and made the approach to the pillar on which the letter was affixed a matter of difficulty."

My remarks on the state of trade generally will, of necessity, be brief this week. Glasgow warrant quotations are 115/ to 115/9, with a slight tendency to fall. Makers prices are as follows: Gartsherrie, No. 1, 130/; No. 3, 125/; Coltness, No. 1, 130/; No. 3, 120/; Summerlee, No. 1, 125/; No. 3, 118/; Carnbroe, No. 1, 125/; No. 3, 118/; Monkland, No. 1, 120/; No. 3, 116/; Clyde, No. 1, 120/; No. 3, 116/; Govan, No. 1, 120/; No. 3, 116/; Langloan, No. 1, 127/6; No. 3, 118/; Calder, No. 1, 125/; No. 3, 120/; Glengarnock, No. 1, 125/; No. 3, 119/; Eglinton, No. 1, 120/; No. 3, 117/6; Dalmellington, No. 1, 120/; No. 3, 117/; Carron, No. 1, 125/; Shotts, No. 1, 127/6; No. 3, 118/6: Kinneil, No. 1, 120/; No. 3, 115/. A new steamer, the Georgia, has just been built at Glasgow for the State Line Steamship Company (Limited), to run from Glasgow and Ireland to New York. She is 2500 tons register, has engines working up to 1600 horse-power, and has been built by the London and Glasgow Iron Shipbuilding Company. Messrs. Hamilton, of Port Glasgow, have launched the Delambre, 1240 tons, for Messrs. Lampert & Holt, of Liverpool, for employment in the Brazilian trade. During August the tonnage launched on the Clyde was 21,000—3000 tons more than in August, 1872. The largest vessel turned out in the month was the Ethiopia, 4250 tons, 550 nominal horse-power, for the Anchor Line Steamship Company, Henderson Bros. There is no particular change in the Cleveland district. The Danks furnace, at the Erimus Works, has just been started, with what result I shall be able to state next week. In the Sheffield locality, South Yorkshire and Derbyshire, no news of importance has transpired, business being fairly brisk in the heavier trades, but dull or very moderate in the light ones, such as cutlery. At Birmingham no change has taken place in prices, but it has transpired that a meeting of most of the leading iron masters of the country has been held in London, at which it was unanimously decided that the wages of iron workers should be reduced after October 4th. So far as Staffordshire is concerned, an intimation of this has been conveyed to the men, and a meeting of the Arbitration Board has been summoned for the 29th instant, to consider the matter. On the other hand, the iron workers, at their conference now sitting, desire to obtain an advance! Human foresight can hardly be expected to penetrate this Gordian Knot, into which the relations between capital and labor have become twisted. In East Worcestershire, the nailers, numbering about 25,000 persons, have resolved to cease work unless an advance of 10 per cent. be conceded. From South Wales the intelligence is not very striking, the most interesting item being that relative to the Cyrfarthfa sale. Locally a good deal of astonishment is expressed, but it is well known that Mr. Crawshay has long refrained from adopting any of the more modern machinery appliances in general use, thus leaving plenty of room for enterprise on the part of the buyers. The Coal and Ironmasters' Association, of South Wales and Monmouthshire, is becoming consolidated, and is assuming considerable proportions. A reserve fund of £300,000 is to be formed. All the leading firms and individuals have given in their adhesion to the scheme, which is, I opine, a powerful nucleus for a national organization to radiate from. The metal trade is, as a rule, firm.

Copper.—There has been a considerable reaction, and although generally the market has ruled steady, the amount of business done has been comparatively small. At the Swansea ticketing on Tuesday, 3000 tons were sold; the average produce was 17 per cent., and the average price was, for ore, 15 8½ per unit, and for Cape 16/10. The same day the standard was advanced £2. 6/9 per ton. The sales reported were, Thursday, 175 tons Chili bars, g. o. b., sold at £86, cash, and 50 tons at £86. 10/, with one month. In Australian, 50 tons Wallaroo sold at £94. 10/, cash; 200 tons regulus and 100 tons ore sold at 17 per unit. Friday, the market was very dull, the only sales reported being 25 tons Chili bars. "Buzeta" at £87 per ton. Saturday private sales were effected at prices not made public, and, in addition, 50 tons Chili bars, g. o. b., at £86. 50 tons Burra Burra at from £92. 10/ to £93. 10/ cash, and 25 tons at £94, with five weeks. In Australian, 50 tons Wallaroo sold at 94. Monday.—50 tons Chili bars, picked brands, sold at £86, and in Australian, 50 tons Wallaroo at from £93. 10/ to £93 15/. 270 tons regulus sold at 17/. Liverpool, Tuesday.—Sales were nominal, pending the result of the Swansea ticketing. The standard was advanced £2. 6/9. Wednesday.—No sales. Prices nominally unaltered.

Tin.—The market has been very dull throughout the week. 10 tons of Straits were sold on Thursday at £126. 10/, and 35 tons at £127. On Friday 10 tons Straits sold at from £126. 10/ to £127, and later in the day 15 tons sold at £126 10/; 10 tons were also sold at £124 for end of year. 118 tons Australian ore, nearly all fine, sold on Tuesday at from £70 to £70. 5/. Tin plates are unaltered. Lead is firmer. Good Spanish has sold at £23. 7/6 in bulk, and good soft English pig, £23. 10/ to £24. Spelter is in better request. Silesian is worth £27. 10/.



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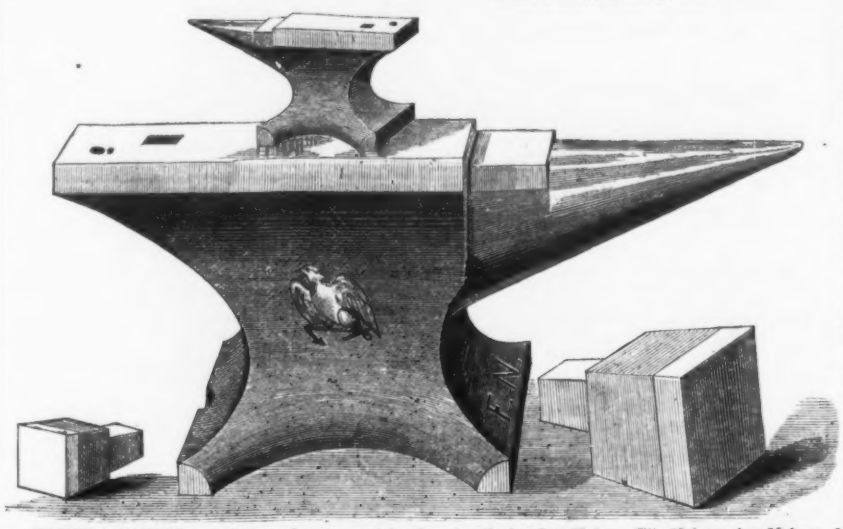

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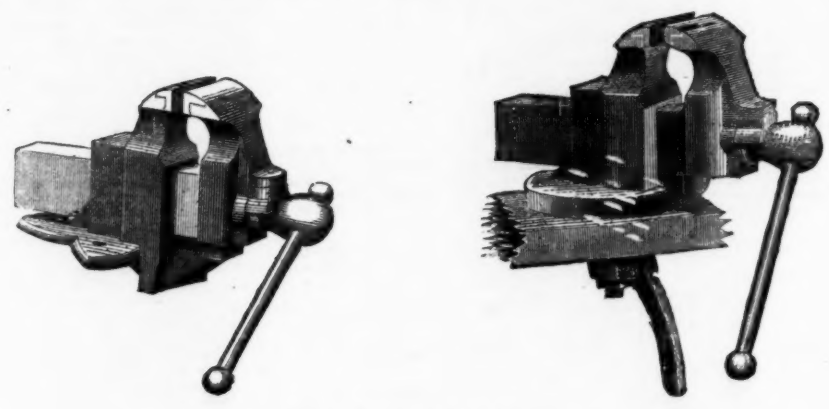

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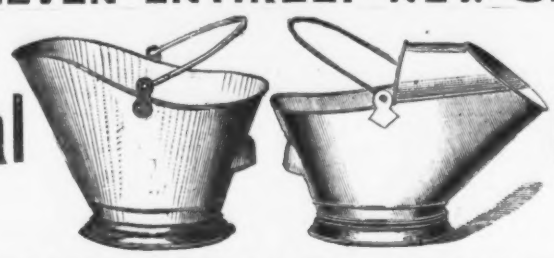

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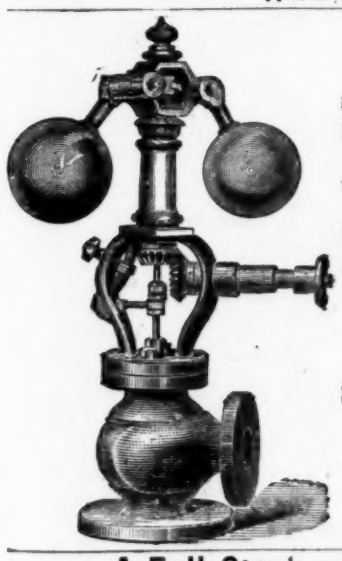

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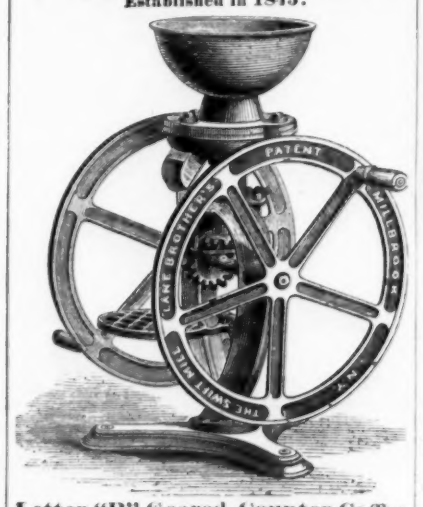

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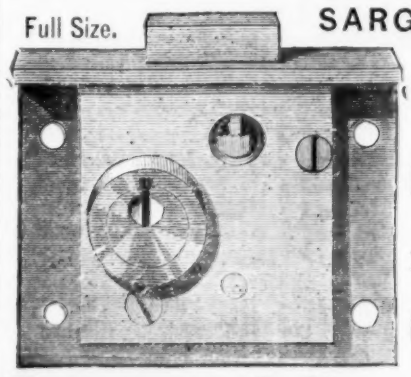


SARGENT & GREENLEAF'S

Celebrated

UNPICKABLE LOCKS.

Drawer, Trunk,

HOUSE AND STORE DOOR LOCKS,

PAD LOCKS,

Night Latches, Etc.,

WITH FLAT GERMAN SILVER KEYS.

Combination Bank and Safe Locks.

Also the

Patent Adjustable Elbow.

For Stove, Furnace, Conductor, and all other Sheet Metal Pipes, With Universal Adjustable Joints.

Can be changed at will to any desired angle. Its advantages over all other Elbows are at once apparent.

For Beauty, Strength and Durability it is Unequaled.

Manufactured by

Sargent, Greenleaf & Cole,

P. O. Box 4598. 300 Broadway, N. Y.

Send for Catalogue and Price Lists.

New York Wholesale Prices, October 8, 1873.

HARDWARE.

Anvils.
Solid Cast Steel.....₱ lb 14c
Wright's.....₱ lb gold 12c; over 350 lbs 12½c, gold
Armitage's Mouse Hole.....gold 12c
Wilkinson's.....₱ lb gold 11½c
Eagle Anvil Co. ₱ lb 12c.....dis 15 @ 15&5 %

Apple Parers.
Turn Table.....
Lightning.....} $8·50 ₱ doz
Conqueror.....
Reading.....₱ doz $ 00
Union.....₱ doz 9 00
Bay State, Paring, Coring and Slicing.....15 00 | dis
Skeleton " " " .....9 00 | 2 %
Climax Slicer.....9 00 |
Bay State Peach Parer.....$11 00 @ 11 50
Lightning " " .....11 00 @ 11 50
Peach Stoner and Halver.....7 00

Augers and Bits.
Snell Mfg. Co.....dis 15 @ 20 %
Russell Jennings.....dis 10 %
Douglass Mfg. Co., Extra.....dis 25 %
" " No. 1.....dis 25&5 %
" " Hollow Augers.....dis 25 %
Cushman's Expanding Hollow Augers.....dis 20&10 %
Ives'.....dis 25 %
" Hollow Augers.....dis 30 %
" Expansive Augers.....dis 30 %
" " Bits.....dis 25 %
Andrews' Bits.....dis 20 %
Cook's Patent Augers.....dis 30&10 %
" " Bits.....dis 25&10 @ 30&10 %
Shepardson's Double Cut Bits.....dis 20 %
Griswold's Patent.....dis 20 %
Cast Steel Cut Augers.....dis 30&10 %
" Auger Bits.....dis 30&10 %
Long Augers.....new list dis 30 %
Rooney's Parent Hollow.....$48 per doz—dis 25 %
Stearns' " " .....$48 per doz—dis 30 %
Morse's Bit Stock Drills.....dis 20 %

Axes.
Blood's.....$12 50 @ 14 00
Hunt's.....₱ doz $15 00 @ 17 50 net @ dis 5 %
Collins'.....₱ doz 12 00 @ 16 00 net @ dis 5 %
Hurd's.....₱ doz 12 50 @ 13 50
Schweitzer Mfg. Co.'s.....₱ doz 13 00 @ 13 50
Simmons'.....₱ doz 12 00 @ 13 50
Morris'.....₱ doz 12 50 @ 13 50
Red Jacket.....₱ doz 12 00 @ 12 50
Mann's.....₱ doz 12 50 @ 13 00
" Double Bitted.....₱ doz 21 50 @ 22 00
Powell Tool Co., "Peerless".....₱ doz 13 00 @ 14 50
Underhill's.....₱ doz 12 50 @ 13 50
" Crown.....₱ doz 13 00 @ 14 00
John Leverett's.....₱ doz 14 50 @ 15 50

Balances.
Chatillon's.....} new list dis 15 %
Frary's.....}
Morton's.....}

Bands.
Plated.....add 10; dis 5 %
Iron.....dis 15&5 %
Brass (Plated list).....dis 5 %
Oroide.....add 15; dis 5 %

Bells.
Hand, Light Brass.....dis 60&10 %
White Metal.....dis 45&10 %
Globe.....dis 20 %
Swiss Hand.....dis 10 %
Abbe's.....dis 10&10 %
Taylor's Patent Door.....net
Western Gong.....net
Brook's Crank.....net list
" Pull.....dis 15 %
Hart Mfg. Co., Crank and Pull.....new list dis 50 %
Cow—Common Wrought.....new list dis 33⅓ %
Western.....new list dis 33⅓ %
Kentucky "Star".....new list dis 20 %
Dodge's Genuine Kentucky.....new list dis 25 %
Yaw's Genuine.....dis 20 %

Bellows.
Blacksmiths'.....dis 10 %
Moulders'.....dis 15 %

Blind Fasteners.
Van Sand's.....₱ gross $14 00
Washburn's Patent.....₱ gross 11 00
Merriman's.....add 85 @ 40 %

Blind Staples.
Boardman's Patent, ½ in. and larger.....₱ lb 37½c
" ⅜ in....." 42 c

Bolts.
Carriage and Tire, Ætna Nut Co.....dis 60 %
Stove, Ætna Nut Co.....dis 10&5 %
Cast Iron Barrel, Shutter, &c.....old list dis 50&10 %
Wrought Iron Barrel.....net
" " Square.....dis 10&10 %
Carriage and Tire, Common.....dis 70&10 %
" " " Norway Iron.....dis 40 %
Star, Philadelphia.....dis 40 %
Eagle, Philadelphia.....dis 40 %
Philadelphia Pattern, P. S. & W.....dis 50&10 %
Carriage and Tire, R. B. & W.....old list dis 50&5 %
Plow, R. B. & W.....dis 30 %
Stove, R. B. & W.....dis 10 %
" Shelton Co. Shaved Heads.....dis 10 %
Union Nut Co.....dis 50&15 %
Machine.....dis 25 @ 30 %

Borax.—Per case of 100 lbs.....₱ lb 22c

Boring Machines.
Kellogg's.....dis 10 @ 15 %
Snell Mfg. Co., Rice's Patent.....dis 15 %
" " Regular.....dis 15 %
Douglas Mfg. Co.....dis 20 %
Hovey's Angle.....$6 00 @ 6 25
" Upright.....4 25 @ 4 50
Morticing Machines each.....$18 00

Bow Pins......dis 45 @ 50 %

Braces.
Barber's Patent.....dis 40 %
Wilson Mfg. Co.....net @ add 5 %
Spofford's Patent.....dis 40 %
Noble's Patent.....dis 33⅓ %
Bartholomew's American Ball.....dis 10&10 %
" " Patent Grip.....dis 40 %
Q. S. Backus & Co.....dis 30&10 %

Bung Hole Borers.
Common and Ring.....dis 20 %
Enterprise Mfg. Co.....dis 20&5 %
Ives' Tap Borers.....dis 20 %

Butchers' Cleavers.
Bradley's.....dis 15 %
Beatty's.....new list dis 10 %

2	4	5	6	7	8	9
$19·00	$21·50	$24·00	$27·00	$30·00	$33·50	$36·50	$40·00

Hart Mfg. Co.....dis 45&10 %

0	1	2	3	4	5	6
$25·25	$29·75	$30·25	$33·75	$43·75	$43·00	$54·00

Butts.
Wrought Brass.....new list dis 20 %
Cast Fast Joint, Narrow.....dis 40 %
" " Broad.....dis 40 %
Cast Loose Joint, Narrow.....dis 50 %
" " Mayer.....dis 40 %
" " Parliament.....dis 40 %
Loose Pin.....dis 40&10 %
Wrought Fast Joint, Narrow.....dis 20 @ 20&5 %
Wrought Broad.....dis 35 %
" Loose Joint.....dis 35 %
Wrought Table and Pack Flaps.....dis 25 @ 25&5 %
Cast Butts, Ohio Butt Co.—
Narrow Fast, Drilled and Wire Jointed (old list).....dis 35 %
Broad Fast, Drilled and Wire Jointed.....dis 35 %
Broad, Loose, Drilled and Wire Jointed.....dis 45 %
Silver Tipped.....dis 15 %
Loose Joint, Japanned.....dis 25 %
Loose Joint, Acorn and Silver Tipped.....dis 40 %
Palmer Blind Butts.....dis 30&10 %
Nicholson Blind Butts.....dis 40&10 %
Parker's Blind Butts.....dis 40&10 %
A. S. Parker's.....dis 40&10 %
Clark's Blind Butts.....dis 40&10 %
Clark's Blind Hinges, No. 20.....dis 50&5 %
Seymour's.....dis 40&10 %
Sherard's.....dis 40&10 %
Garretson's.....dis 40&10 %
Standard.....dis 40&10 %
Union Mfg. Co.—
Drilled and Wired Cast Fast.....dis 35 %
" " Loose.....dis 45 %
Loose Joint Japanned or silvered Acorn.....dis 45 %
" " Figured Enameled.....dis 25 %
" " Nickel Capped.....dis 35 %
" " Solid Bronze.....dis 10 %

Caps—Percussion, per 1000.
C. D.....40c
Eley's E. B.....1-4s, 62c.; 1-10s, 67½c., gold
" Double Waterproof, 1-4s, 81·50; 1-10s, 81·50½c., gold
Colt's.....1-4s, 72½c.; 1-10s, 84½c., gold

Cartridges.
Metallic.....dis 50 %

Cards.
Horse and Curry.....dis 2a&10 %
Cotton.....new list dis 10&10 %
Wool.....new list dis 10&10 %

Casters.
Iron and Wood Wheel Plate.....new list dis 20&10 %
Brass Wheel Plate.....new list dis 20&10 %
Porcelain Wheel Plate.....new list dis 20&10 %

Chain
English Coil.....net gold

₱ lb.	3-16	¼	5-16	⅜	7-16	½
	13½	10	9¼	8½	8½	8½c

Trace, 6½ 10-2.....₱ pair, gold, 62c
Trace, 7-10-2.....₱ pair, gold, 61c
Galvanized Pump Chain.....₱ lb 14c
German Halter Chain.....new list, gold, dis 25 %
German Coil.....new list, gold, dis 25 %
Jack Chain, Iron.....dis 25 %
" " Brass.....dis 21½& 25 %

Chalk.
White.....₱ gross, 60c
Red.....₱ gross, 80c
Blue.....₱ gross, 90c
Carmine.....₱ gross, 15c

Cherry Stoners.
"Faultless".....₱ doz $9·00

Chisels.
Socket Firmers.....dis 60&5 @ 60&10 %
Socket Framing.....dis 60&10 %
Socket Corner.....dis 60&10 %
Tang Firmers.....dis 40 to 30&10 %
Butchers'.....$5·50 to £ gold—new list
Newbould's.....$5·50 to £ gold
Spear & Jackson's.....$5·50 to £ gold—new list

Clips, Axle.
Norway or Best.....dis 20 @ 30 %
Superior.....dis 40&5 %
"Star," Superior, Philadelphia.....dis 45&5 %

Coal Shovels.
Iron Handled.....₱ doz, $ 85 @ 1 25
Wooden Handled.....₱ doz, 1 00 @ 2 00

Coal Hods.
Smith, Burns & Co.....dis 25 %

No.	11	15	16	17	18	
Japanned	$9·00	9·75	10·50	12·00	13·50	per doz
Galvanized	13·00	14·50	15·50	17·50	19·50	"

Common Japanned.....dis 50&10 %
" Galvanized.....dis 40&10 %

Cocks.
Brass Racking.....dis 20&10 %
Lock and Globe.....dis 20&10 %

Coffee Mills.
Board and Box.....dis 15 %
Increase Wilson's.....new list dis 10 %
Selsor's Pat.....$9·50, $10·50—dis 20 %
French Steel.....dis 10 @ 20 %
"Champion".....dis 30 %
Swift's.....dis 20 %

Compasses and Dividers.
Bemis.....dis 15&15 @ 20&5&15 %
Excelsior.....dis 30 %
Peck Stow & Wilcox.....dis 25 %

Coopers' Tools.
Bradley's.....dis 15 @ 20 %
Chas. E. Little.....dis 15 @ 20 %

Corn Knives and Cutters.
Bradley's.....list net

Crucibles.
Gautier & Co.....₱ No. 5½c

Curry Combs.
Hotchkiss' and Kellogg's, Iron and Brass.....dis 15 %
Fitch's.....dis 15&10 %
Ruggles'.....dis 15 @ 20 %
Rubber.....₱ doz, $9·00—dis 10 %
Schweitzer Mfg. Co.....dis 20 %

Curtain Pins.
Stained Glass.....dis 40&10 %

Cutlery.
American Table.....
American Pocket.....dis 15 %

Door Springs.
Gray's.....$7·50 per doz—dis 40&10 %
Torrey's Patent.....$7·50 ₱ doz—dis 40 @ 40&10 %
Palmer's Japanned No. 6.....₱ doz $8·00
" Coppered " .....6·00
" Silvered " .....8·00
Challenge.—
Japanned.....₱ doz $4 00 @ 6 00
Bronzed.....₱ doz 5 00 @ 7 00
Nickel Plated.....₱ doz 6 50 @ 9 00
1 Gross lots.....dis 10 %
5 Gross lots.....dis 20 %

Drawing Knives.
Bradley's.....dis 60 @ 60&10 %
.....dis 25 %

Drills.
Ingersoll's Ratchet.....dis 25 %
Moore's Triple Acting Ratchet.....dis 20 %

Egg Beaters.
Monroe's.....₱ doz net $8·25 @ 8·50
Ashley's.....₱ doz net 2·25 @ 3·00
Earle's Patent.....₱ doz net 5·50 @ 6·00
Pratt's Aerating.....dis 10 %
Dover.....₱ doz net $6·00

Emery.
Genuine Chester—Regular Nos.....₱ lb 8c } dis 5 @ 17 %
" Flour and FF.....₱ lb 5c }
Washington Mills—Regular Nos.....₱ lb 8c
" Flour.....₱ lb 5c

Enameled and Tinned Ware.
Kettles.....dis 15 %
Sauce Pans, Glue Pots, &c.....dis 10 %

Faucets.
Cork Lined, Wood.....dis 60 %
Fenn's.....dis 50 %
" Cork Stops.....dis 40 %
Star.....dis 40 %
Frary's Patent Petroleum.....dis 55&10 %
Taylor's Pattern " .....dis 10&10 %
Wood and Metallic.....dis 20&10 %

Files.
Nicholson.....$5 00 to £ currency
Newbould's.....5 50 to £ gold
J. & Riley Carr's.....5 50 to £ gold
" " Rasps.....5 75 to £ gold
Stubs'.....8 50 to £ gold
Butcher's.....5 50 to £ gold
Spear & Jackson's.....5 50 to £ gold
Hargreaves, Smith & Co.'s.....5 50 to £ gold
Jowitt's.....5 25 to £ gold
" Western".....5 00 to £ net
W. K. & C. Peace's "Imperial".....5 25 to £ gold
R. Ibbotson.....5 00 to £ gold
Beam & Murray, "Cyclops".....5 00 to £ gold
Fisher's.....4 85 to £ gold
Goodlad's.....4 75 to £ gold
Moss & Gamble.....5 25 @ 5 50 to £ gold

Fluting Machines.
Acme.....$7 00 each net
Cole.....5 75 each net
Manville, No. 3.....7 00 each net
Knox, with 4-inch Rolls.....5 00 each net
" " 6 " .....6 00 each net
O. K.....6 50 each net
Peerless, 4-inch Rolls.....4 00 each net
" 5 " .....4 75 each net
Excelsior, No. 1.....6 50 each net
" No. 2.....7 50 each net
Diamond.....8 00 each net
Climax 7-inch Rolls.....6 50 each net
" 4½ " .....4 00 each net
Empire.....4 00 each net
Eureka, No. 1, 7-inch Roll.....8 00 each net
" No. 2, 5-inch Roll.....6 00 each net
K. F. M., 4-inch Roll.....5 50 each net
" 6-inch Roll.....6 00 each net
Myers' Fashion Fluter, 4½-inch Rolls.....3 00 each net
" Convex Brass Fluter, Sad Iron attachment.....$1·75
Domestic Fluter.....1·75 each net
Fairy, Self-Heater.....10 00 each net
National, 5-inch Rolls.....5 00 each net
Ponton Fluter, Bright.....1 50—dis 25 %
" " Galvanized.....2 00—dis 25 %
Geneva Hand Fluter.....1 25 each net

Fry Pans.
Tinned.....dis 20 %

₱ doz.	$3·00	3·25	3·62	4·00	4·50	5·00	5·50	6·00	7·50
No.	0	1	2	3	4	5	6	7	8

Peck, Stow & Wilcox.....dis 25 %
Smith, Burns & Co., "Excelsior" Polished.....dis 20 %

₱ doz	$3·70	4·00	4·70	5·30	6·00	7·00	8·00	9·00
No.	1	2	3		5	6	7	8

Hammers.
Emmet Hammer Co.....dis 10 %
Maydole's.....new list net
Cheney's.....new list net
Verree.....dis 5 %
Yerks & Plumb.....new advanced list dis 5 @ 10 %
Minot & Co.....dis 15 %

Handles.
Hammer and Hatchet.....dis 10 %
Quakertown, Axe, Pick and Sledge.....dis 10 %
" Hammer and Hatchet.....net
Greensboro', Axe, Pick, Hammer, &c.....dis 10 %
Woolworth Axe, Pick and Sledge.....dis 10 %

Harness Snaps.
Judd's.....dis 30 %
Fitch's.....dis 30 %

Hatchets.
Isaiah Blood.....dis 10 %

Shingling, Nos.	1	2	3	₱ doz	$7 50	8 00	8 50
Claw, "	1	2	3	₱ doz	8 50	9 00	9 50
Lathing, "	1	2	3	₱ doz	7 50	8 00	8 50

Hunt's.....dis 20 %

Shingling, Nos.	1	2	3	₱ doz	$7 25	8 00	8 75
Claw, "	1	2	3	₱ doz	7 75	8 50	9 25
Lathing, "	1	2	3	₱ doz	7 50	8 25	9 00

Hurd's.....dis 20 %

Shingling, Nos.	1	2	3	₱ doz	$8 00	8 50	9 00
Claw, "	1	2	3	₱ doz	8 50	9 00	9 50
Lathing, "	1	2	3	₱ doz	8 00	8 50	9 00

Newark's Edge Tool Co.'s.....dis 25 %

Shingling, Nos.	1	2	3	₱ doz	$6 50	7 00	7 50
Claw, "	1	2	3	₱ doz	7 25	7 75	8 25
Lathing, "	1	2	3	₱ doz	6 50	7 00	7 50

Yerks & Plumb.....dis 10 %

Shingling, Nos.	1	2	3	₱ doz	$7 00	7 50	8 00
Claw, "	1	2	3	₱ doz	7 50	8 00	8 50
Lathing, "	1	2	3	₱ doz	7 00	7 50	8 00

Simmon's.....dis 10 @ 15 %

Shingling, Nos.	0	1	2	3	₱ doz	$7 50	8 00	8 50	9 00
Claw, "		1	2	3	₱ doz		9 00	9 50	10 00
Lathing, "		1	2	3	₱ doz		8 00	8 50	9 00
Broad, "		1	2	3	₱ doz		9 00	10 00	12 00
" "		4	5	6	₱ doz		11 00	16 00	18 00
" "			7	8	₱ doz		20 00	22 00	

Elephant.....dis 20 %

Shingling, Nos.	1	2	3	₱ doz	$6 00	8 00	9 00
Claw, "	1	2	3	₱ doz	9 00	9 50	10 00
Lathing, "	1	2	3	₱ doz	8 00	8 50	9 00

J. P. Verree & Co.....dis 5 %

Shingling, Nos.	1	2	3	₱ doz	$7 00	7 50	8 00
Claw, "	1	2	3	₱ doz	7 50	8 00	8 50
Lathing, "	1	2	3	₱ doz	7 00	7 50	8 00

Underhill's.....dis 10 %

Shingling, Nos.	1	2	3	₱ doz	7 25	8 00	8 75
Claw, "	1	2	3	₱ doz	7 75	8 50	9 25
Lathing, "	1	2		₱ doz	11 00	12 00	

Hinges.
Wrought strap and T.....dis 30&7½ %
Providence Plate.....{ 6 and 8 in. list 11c. } dis 10&5 %
{ over 8 in. list 9½c. }
Screw Hook and Strap.....{ 4, 5, 6, 7, 12 in. 8½c; } net
{ 14 to 36 in. 7½c }

Hoes.
Solid Shank, C. S.....₱ doz $8 00—dis 20 @ 25 %
Socket.....₱ doz 9 00—dis 20 @ 25 %
Riveted Eye.....₱ doz 5 00—dis 20 @ 25 %
Grub.....dis 20 %
Planters'—Winsted.....add 10 %
" Scovill.....add 33⅓ %
" Fairbanks' Pattern (Winsted).....add 20 %

Hooks.
Belt.....dis 50 %
Bench.....₱ doz net $3 00 @ 8 50
Wardrobe, Japanned.....new list dis 10&10 %
Hat and Coat " .....new list dis 15&10 %
Wrought Staples and Hooks and Staples.....dis 60 %
Wrought Hasps and Staples and Hasps, Hooks and Wrought Staples.....dis 60 %
Screw Hooks and Eyes, revised list.....dis 65&10 %

Horse Nails.
Putnam's.

No.	5	6	7	8	9	10
	32c	24c	26c	25c	24c	23c

In lots 2000 lbs. dis. 5 %.
Ausable

No.	5	6	7	8	9	10
	30c	7c	25c	24c	23c	22c

In lots of 1000 lbs. 5 % discount.
Brundage.

No.	5	6	7	8	9	10
	28c	26c	24c	23c	22c	21c

In lots of 500 lbs., dis. 5 %.
American Pressed.

No.	5	6	7	8	9	10
	22c	20c	20c	20c	20c	20c

In lots of 1000 lbs. dis 5 %.
Perkins Finished (ready to drive).

No.	5	6	7	8	9	10
	31c	28c	26c	25c	24c	23c

In lots of 1000 lbs. dis 5 %.
Buffalo Forged.

No.	5	7	8	9	10
	28c	26c	25c	24c	23c

Globe (Pointed and Polished).

No.	5	6	7	8	9	10
	31c	28c	26c	25c	24c	23c

In lots of 1000 lbs., 5 % discount.
National (Pointed and Polished), Extra Finish.

No.	5	6	7	8	9	10
	30c	27c	25c	24c	23c	22c

In lots of 1000 lbs., dis 5 %.
Vulcan (Blued, pointed, ready to drive).

No.	5	6	7	8	9	10
	28c	30c	28c	27c	26c	25c

In lots of 500 lbs., 5 % discount.
" 1000 lbs 7½ % discount.
New London Horse Nails.

No.	6	7	8	9	10
Great Western	27c	25c	24c	23c	22c
U. B.	29c	27c	26c	25c	24c

In lots of 1000 lbs., dis 5 %.
Star Brand.....₱ lb 16c
Morgan.....16c

Horse Shoes.
Burden.....₱ keg, $6 37½
Shoenberger.....₱ keg, 6 37½
R. I. Horse Shoe Co., Perkins Pattern.....₱ keg, 6 37½
" " R. I. Pattern.....₱ keg, 6 87½
Mule Shoes.....₱ keg, 7 37½

Kettles.
Enameled.....dis 15 %
Brass.....₱ lb 50c
In lots of 500 lbs.....₱ lb net

Knives.
Ames' Butcher Knives.....dis 20 %
" " Shoe " .....dis 15 %
Hay and Straw, "Wadsworth's".....dis 20 %

Knobs.
Base—Common.....net
" Plush Tip.....dis 10 %
" Elastic End.....reduced list dis 10&10 %
Trenton Lock Co.....dis 40 %

Lanterns.
Brady's Patent.....dis 10 %
Ætna.....dis 10 %
Yankee.....dis 10 %
De Beque.....dis 10 %

Locks and Latches.
Cabinet—Eagle.....dis 25 %
Cabinet—Gaylord.....dis 25 %
Trunk.....dis 10 %
Continental.....dis 15 %
Shepardson's.....dis 20 %
Trenton Lock Co.....dis 40 %
Branford.....dis 40 %
Norwich.....dis 40 %

Meat Cutters.
Dixon's (P. S. & W.).....dis 10 %

No.	1	2	3	4
₱ doz.	$14 00	$17 00	$19 00	$30 00

Halcs'.....dis 25 %

No.	11	12	13
₱ doz	$27 00	$33 00	$42 00

Perry's Champion (P. S. & W.).....dis 10 %

No.	200	300	400
₱ doz.	$22 00	$27 00	$40 00

Woodruff's (P. S. & W.).....dis 10 %

No.	100	150
₱ doz.	$15 00	$18 00

American.....dis 25 @ 25&5 %

No.	1	2	2½	3	4	5
Each	$6 00	$9 00	$14 00	$15 00	$30 00	$75 00

Molasses Gates.
Stebbins' Pattern.....dis 60&10 %
Tinned ends.....dis 40&10 %
Weed's Patent Self-Boring.....dis 15 %
" " without Auger Bit.....dis 40 @ 50 %
Patent Self-Measuring.....per doz $42 00—dis 30 %

Mouse Traps.
Wood Choker.....₱ doz holes, 16 @ 20c

Nails.
10d Cut (Standard).....$4 75

Nuts and Washers.
Nuts.....large, 4c; small, 5c off list.
Washers.....large, 5c; small, 7c off list

Oil Stones.
Washita No. 1.....₱ lb 22c
" Slips.....₱ lb 4½c
Hindostan.....₱ lb 6c dis 10 %
" Slips.....₱ lb 10c dis 10 %

Oilers.
Olmsted's.....dis 25&10 %
Broughton's.....dis 25&5 %
Common Zinc, Brass and Copper.....dis 25 %

Picks.
Washoe R. R. Nos.

₱ doz...	1	2	3	4	5
	$14·00	15·00	16·00	17·00	18·00
Washoe Coal, "	$8·50	9·00	10·00	11·00	13·00	15·00

Picture Nails and Knobs.
Richards' Patent.....dis 40 @ 40&10 %

Planes.
Sandusky Tool Co., 1st quality.....dis 20 %
" " 2d " (Ogontz).....dis 20&10 %
Ohio Tool Co., 1st quality.....dis 20 %
" " 2d quality (Sciota).....dis 20&10 %
Owasco Tool Co., 1st quality.....dis 25 %
" " 2d quality.....dis 25&10 %
Plane Irons.....list net
" Butcher's.....$5 50 to £ gold—new list
" Spear & Jackson's.. 5 50 to £ gold—new list
" Sandusky Tool Co.....list net

Plumbs and Levels.
Standard Rule Co.'s New Adjustable.....dis 50&10 %

Pumps.
Douglas Cistern, etc.....new list dis 25 %
" S. & F.....new list dis 20 %

Rakes.
Cast Steel.....dis 25 %

$8 00	9 00	10 00	11 00
8	10	12	14 teeth.

Razor Straps.
Genuine Emerson (B. F. Badger).....dis 40&10 %
Hunt's.....dis 25&10 %
Chapman.....dis 10 @ 15 %

Rivets.
Iron and Tinned.....dis 25 %
Copper Rivets and Burrs.....dis 10 %

Rods.
Stair.....new list dis 25 %
American Patent.....dis 25 %

Rope. Manufacturers' List
Manila.....½ inch and larger ₱ lb 14c
" .....⅜ inch ₱ lb 18½c
" .....¼ and 5-16 inch ₱ lb 19 c
" Lath Yarn.....₱ lb 19 c
" Hay Rope.....₱ lb 18½c
Sisal.....½ inch and larger ₱ lb 16 c
" .....⅜ inch ₱ lb 16½c
" .....¼ and 5-16 inch ₱ lb 17 c
" Hay Rope.....₱ lb 16½c

Rules.
Hubbard & Curtiss Mfg. Co.....new list net
Stanley Rule and Level Co.'s Ivory.....dis 50&10 %
" " " Boxwood.....dis 6 &10 %
Standard Rule Co.'s Boxwood.....dis 60&10 %
" " " Ivory.....dis 50&10 %

Sad Irons.
Sad Iron, Nickel Stand attached.....₱ lb 4½c net
Sand Paper—dis 7½ @ 10 %.....₱ lb 9c
Beader & Adamson's (Flint) 00 to 1½.....$4 50 ₱ ream
" " " 2, 2½ & 3.....5 00 "
Assorted.....4 50 "
Star.....₱ ream $3 50
Emery.....₱ ream $7 00 @ 12 00
Cowdin Mfg. Co.....dis 7½ @ 10 %
Diamond Flint, 00 to 1½.....per ream $4 50
" " 2, 2½, 3 and assorted.....5 00
" Emery Paper.....per ream $7 00 to 12 00

Sash Locks.
Clark's.....dis 20 %
Ferguson's.....dis 20 @ 25 %
Champion.....₱ gross $13 00 @ $15 00
Norwich.....dis 15 %

Sash Weights.
Solid Eyes.....₱ lb 2½c

Sausage Fillers.
Perry's (P. S. & W.).....dis 10 %

No.	1	0
₱ doz.	$15 00	$21 00

Saw Rods.
.....dis 10 %

Saws.
Spear & Jackson's.....$4 50 to £ gold
John Spear.....$3 60 to £ gold
Am. Saw Co.....new list
Perforated Cross Cuts, all kinds.....65c ₱ foot
Inserted Tooth.....dis 10 %
All else.....dis 12½ %
Disston's.....dis 12½ %
H. W. Peace's Circulars.....dis 10 %
Other kinds.....dis 10 %
Wm. McNiece's Hand, Cross Cut and Circular.....
E. M. Boynton's Lightning.....new list dis 10 %
" " Others.....dis 10 %

Scales.
Brown's.....dis 25&5 %
Fairbanks'.....new list dis 15 @ 20 %
Howe's.....dis 15&5 %
Shattuck's Counter and Union.....dis 15 %
National Platform.....dis 25 %
Eureka.....dis 25 %
Scale Beams.....dis 30 %
No. 1 300 to 1200 lbs.....60c ₱ cwt
No. 2 " " .....75c ₱ cwt

Screws.
American list of April 1, 1873.
Flat Head Iron.....dis 47½ %
Round Head Iron.....dis 45 %
Flat Head Brass.....dis 60 %
Round Head Brass.....dis 50 %
Round Head Silver Capped.....new list dis 30 %
Hand Rail.....dis 10 %
Coach or Lag.....dis 25 %
Coach, Patent Gimlet Point.....dis 15 %
Bed.....list net

Scythes.
Blood's German Steel, Grass.....₱ doz $9 00
" Cast " " .....₱ doz 10 00
" Silver " " .....₱ doz 11 00
" German " Grain.....₱ doz 13 00
" Cast " " .....₱ doz 14 00
" Red Rover.....12 00
" Young America.....9 50
" Silver Clipper.....12 63
Scythe Snaths.....dis 20 %

Shears.
Cast Steel.....dis 60&10 %
Conn. Cutlery Co., new brand.....dis 60 %
Rowe's.....dis 50&10 %

Shovels and Spades.
Ames.....new list dis 10 %
Rowland.....new list Feb. 8, '73, dis 20 %
Old Colony.....dis 2½ %

Shovels and Tongs.
Iron Head.....list net
Brass Head.....dis 5 %
Polished Steel.....new list dis 15 %

Slates.
Square Frames, Round Cornered, by case.....dis 60&10 %
Less than a case.....dis 50 @ 55 %
Oval Frames, by case.....dis 40 @ 40&10 %
Less than a case.....dis 30 %

Spoons.
Iron.....new advanced list, dis 10 %
By the case.....dis 20 %
Britannia.....dis 40 %
Plated A 1.....revised list dis 30&5 %
German Silver.....revised list dis 15&5 %
Tinned (P. S. & W.)—
Teas.....$1·50 ₱ gross, net
Tables.....2·75 " net

Stocks and Dies.
.....dis 15 %

Stove Polish.
Joseph Dixon's.....₱ gross, $6 00 @ 6 25
National.....₱ gross $4 75
Gold Medal.....₱ gross $6 00, dis 15 %
Gem.....₱ gross $5 00, dis 10 %

Squares.
Steel.....dis 50 %; full cases, dis 50&10 %
Iron.....dis 50 %; full cases, dis 50&10 %
Nickel Plated.....add $2 50 @ $4 00 ₱ doz net
Try Squares and T Bevels.....dis 45&10 %
Star Try Squares and Bevels.....dis 30 %

Tacks.
Full Weight American Iron.....dis 35&7½ %
Half Weight American Iron.....dis 67½&7½ %
Carpet.....dis 7½ %
Brads American Half Weight.....dis 50&7½ %
Finishing Nails.....

½	⅝	¾	1	1¼ in. and over
25c	20c	18c	14c	13c dis 7½ %

Trunk and Clout.....

½	⅝	¾	1	1¼ in. and over
₱ lb.....	25c	30c	18c	14c 13c dis 7½ %

Copper Tacks.....₱ lb 56c—dis 7½ %
Iron Shoe Nails, ₱ lb 4-8 and longer, 10½c; 3½-8 lic.....dis 7½ %
Double Pointed.....new list dis 33⅓ %

Tapes, Measuring.
American Flask and Cap Co.....dis 10&10 %
Eddy's.....dis 10&10 %

Toe Calks.
.....₱ lb 13c net

Tobacco Cutters.
Champion.....dis 20 %
Peck, Stow & Wilcox.....dis 20 %

Tinners' Tools and Machines.
P. S. & W.....list net

Traps.
Newhouse.....dis 20 %
Hotchkiss.....dis 20 %
Peck, Stow & Wilcox.....dis 30 %
Blake's Patent.....dis 15 @ 20 %

Vises.
Trenton Vises, Solid Box.
30 to 110 lbs.....17c
111 to 160 lbs.....18c
160 and over.....21½c
Peter Wright's.....₱ lb 15½c, gold
Wilson's Solid Box.....dis 10 @ 15 %
39 to 160 lbs.....18c
160 and upward.....21c
Backus & Union, Parallel.....dis 25 %
Buffalo, Parallel.....new list dis 15 %
Fisher & Norris' Double Screw Parallel.....dis 15 @ 15&5 %

Wire.
Bright and Annealed.....Nos 0 @ 18 dis 30 @ 35 %
" " " 19 @ 26 dis 40 @ 45 %
" " " 27 @ 36 dis 45 @ 50 %
Coppered.....Nos. 0 @ 18 dis 22½ @ 27½ %
Galvanized, Nos. 6 to 12.....dis 35 @ 40 %
Galvanized, Nos. 13 to 18.....dis 40 @ 45
Tinned.....dis 15 @ 20 %
Cast Steel.....5 @ 10 %
Tinned Broom Wire.....dis 20 @ 25 %
Galvanized Telegraph, Nos. 8 and 9.....₱ lb 10c @ 11c
" " 10 and 11.....₱ lb 11c @ 12c
" " 12.....₱ lb 11½c @ 12½c
Annealed Fence, Nos. 8 and 9.....dis 30 @ 35 %
" Grape, " 10 to 14.....dis 30 @ 35 %
F

FINE WIRE—NET PRICES.

	High Brass.	Low Brass.	Gild'g and Cop'r.
No. 26	0·45	0·49	0·55
No. 27	0·45	0·52	0·58
No. 28	0·50	0·54	0·60
No. 29	0·52	0·56	0·62
No. 30	0·54	0·58	0·66
No. 31	0·56	0·60	0·70
No. 32	0·60	0·64	0·75
No. 33	0·64	0·68	0·85
No. 34	0·68	0·72	0·95
No. 35	0·73	0·77	1·07
No. 36	0·82	0·86	1·19
No. 37	1·02	1·02	1·32
No. 38	1·32	1·32	1·62

Ten cents per pound extra for Spooling.

TUBING.

(Brown & Sharpe's Gauge.)

Plain to No. 20, inclusive.....₩ lb 50 5c
Nos. 21, 22, 23, 2c. advance on List for each No.
Nos. 24, 25, 26, 4c. " "
Above No. 26 special rates.
Plain Tube, 1-4 inch..... 74
" 3-16 " 1 59
" 1-8 " 1 81
All Mandrel-Drawn Tubes 5c. advance on List.
Fancy Tubing 4c. advance on List above Plain.
English, Scotch, and Extra Patterns Fancy Tubing to No. 20.....
Tubing sawed or cut 2 to 4 ft. long, 2c. advance on List.
Add to two cents a half-cent for each additional cutting under two feet. 10 % discount.
BRASS DOOR RAIL. Polished—54 cents per lb.—10 %

BELT AND HOSE COPPER RIVETS AND BURS.

Price per ₩	57	58	60	62	64	66	68	72	76
Nos.	7	8	9	10	11	12	13	14	15

Braziers Rivets, 51 cents per pound discount 10 %.

GERMAN SILVER MARKET METAL AND WIRE.

	Market Metal.	Wire
4 per cent. 12 inch. to No. 26	1·00	1 10
6 " " "	1·10	1·25
10 " " "	1·25	1·45
15 " " "	1·35	1·60
18 " " "	1·45	1·75
20 " " "	1·55	

Discount 10 %.
German Silver Sheets over 12 inches wide and weighing more than 10 lbs.....$2·25 ₩ lb net
Advance two cents for each additional inch in width above 12 inches, and two cents per pound on each No. thinner than Nos. 26 to 36, inclusive.
All German Silver thinner than No. 36 is Platers' at 50 cents per pound additional.
German Silver Scrap, one-third less than net price of 12 inch Market Metal; German Silver Turnings, Filings and Chips, half the price of Scrap.
* Brown & Sharp's Gauge is about two numbers finer than Stubs' Wire Gauge.

COPPER—DUTY: Pig, Bar and Ingot, 5c.; old copper 4 cents ₩ lb; Manufactured (including all articles of which copper is a component of chief value) 45 % ad valorem. All subject to a reduction of 10 per cent.

American Ingot.....₩ lb 26 @ 26½c
English " "

SHEATHING, BRAZIERS' COPPER, BOLTS, &c.

Braziers Copper, ordinary sizes, over 16 oz., per square foot.....40c ₩ lb
Braziers' Copper, ordinary sizes, 16 oz. and over 12 oz., per square foot.....43c. "
Braziers' Copper, 12 oz. per square foot and lighter.46c. "
Circles less than 24 inch in diameter.....43c. "
Circles, 8 4 inch diameter and over.....46c. "
Segment and Pattern Sheets.....43c. "
Locomotive Fire Box Sheets.....40c. "
Sheathing Copper, over 12 oz. per sq. ft.....38c. "
" " 12 oz. ₩ sq. ft. and lighter... 46c. "
Bolt Copper.....46c. "
No Copper in Sheathing except 14x48 inches, and not to exceed 34 oz. to the square foot.

TINNING.

14x48, by the case.....8c. ₩ sheet
14x48, less than case.....10c. "
Boiler Sizes, 7 and 8 inch.....12c. "
" 9 inch.....15c. "
Other sizes not larger than 30x60.....2½c. ₩ sq.
Larger than 30x60.....5c. "
Copper Bottoms, 40c. ₩ lb.....dis 5 %

O'NEILL'S PATENT PLANISHED COPPER.

14x48.

14 and 16 oz. and heavier.....44c. By the case, 43c. ₩ lb
12 oz. and lighter.....47c. " " 46c. "

Boiler Sizes.

7 in., 14x52. 8 in., 4x56. 9 in., 14x60

14 and 16 oz. and heavier.....46c. By the case, 45c. ₩ lb
(And all sizes not over 20 inches wide.)

30x60

14 and 16 oz. and heavier.....53c. ₩ lb
12 oz.....51c. "

LEAD—DUTY: Pig, $2 per 100 lbs.; old Lead, 1½ cent per lb.; Pipe and Sheet, 2½ cents per lb. All subject to a reduction of 10 per cent.

Spanish..... @ 6¾c gold
German Refined..... @ 6¾c gold
English..... @ 7¼c gol'
Bar.....dis 10 %.....9¼c.
Pipe.....dis 10 %.....10½c.
Tin Lined Pipe.....dis 10 %.....16½c.
Sheet.....dis 10 %.....10½c.
Shot.....dis 10 % Drop, 11½c.; Buck, 12½c.
Solder No. 1, 20c. @ 21c. No. 2, 19c. @ 20c.

STEEL—DUTY: Bars, Ingots, Sheets and Coils, valued at 7 cents per lb., or under, 2¼ cents; over 7 cents, and not above 11, 3 cents per lb.; over 11, 3½ cents per lb. and 10 % ad val. Railway Bars 1¼ cents per lb. Railway Bars, in part Steel, 1 cent per lb. All subject to a reduction of 10 per cent. Provided, that Metal cemented, cast or made from Iron by the Bessemer or pneumatic process, of whatever form or description, shall be classed as Steel.

American Cast Steel.

Tool.....17c
Spring.....12½c
Homogeneous.....18½c
Tire.....12½ @ 13½c
Machinery (round and square).....11½ @ 12c
File.....12½c
Sheet.....14 @ 15c
Saw Plate, mill and mulay.....14 @ 16½c
Saw Plate, gang and X cut.....13 @ 14c
" circular as to size.....18 @ 30c

Chrome Steel.

Tool.....₩ lb 20 @ 21c
Tool, extra fine.....40 @ 75c
Spring.....₩ lb 13c and upward
Machinery.....₩ lb 14c.
Hammer.....15c.
Gun or Homogeneous.....16c.

English Steel,—payable in gold, dis 5 % cash.

Best Cast.....₩ lb 19½c
Extra Cast.....20½c
Round Machinery, Cast.....12½c
Swaged, Cast.....21½c
Best Double Shear.....19½c
Blister, 1st quality.....15½c
" 2d quality.....13½c
" 3d quality.....11½c
German Steel, Best.....12½c
do Eagle.....11½c
do 2d quality.....10½c
Sheet Cast Steel, 1st quality.....19½c
" 2d quality.....17½c

SPELTER—DUTY: In Pigs, Bars and Plates, $1 50 per 100 lbs.—less 10 per cent.

Silesian, cash.....7¼ @ 7¾c., gold
American " .....8 @ 11c., currency

TIN—DUTY: Plates, Sheets, Tagger and Terne, 15 per cent. ad val.; Electro-galvanized Plates, 2 cents per lb.; Manufactures of, not enumerated, 35 per cent. ad val.—all subject to a reduction of 10 per cent. Bars, Banca or Block, and Pigs, free.

Banca.....₩ lb 35c., gold
Straits.....₩ lb 32c., gold
English.....₩ lb 29 @ 29½c., gold

CHARCOAL TIN PLATE.

I C 10x14, Prime Charcoal	12·50
12x12, "	13·00
14x20, "	15·25
I X 10x14, "	14·75
12x12, "	15·25
14x20, "	15·75
For each additional X add	2·25

COKE TIN PLATE.

	Best.	2d Quality.	Ordinary.
I C 10x14	$12·00	$11·00	9·50 @ $10·50
I C 12x12	12·50	11·50	
I C 14x20	13·75	11·75	

TERNE PLATE.

	Prime Char.	2d qual.	Coke.
I C 11x20	$11·75	11 @ 11·50	9 @ 11
I X 14x20	13·75		

ZINC.—DUTY: Pig or Block, $1 50 per 100 lbs. Sheet, 2½c. ₩ lb. All subject to a reduction of 10 per cent.

Sheet.....cask 10½c
" .....open 11c

Paper Stock, Old Metals, &c.

(*Dealers' Selling Prices.*)

Canvas linen	6 @ 6¼
" cotton, No. 1	7 @ 7¼
" " No. 2	4
White linen rags, No. 1	7 @ 7¾
" " No. 2	4¾ @ 5
Colored	3 @ 3½
Mixed woolens	2 @ 3
Soft woolens	6½ @ 7
Ginny bagging	1½ @ 1¾
Jute Butts	1¾ @ 2
Kentucky bagging	3½ @ 3¾
Book stock	4¼ @ 4¾
Waste paper and scraps	2½ @ 3
Rope cuttings	1½ @ 3
Kentucky Bale rope	4 @ 4¼
Oakum junk, No. 1	5¼ @ 5½
" No. 2	4½ @ 4¾
Grass rope	4¼ @ 4¾
Tarred Shaking	1¾ @ 2

Old Metal.

Copper	24 @ 25
Yellow metal	18 @
Brass	18 @ 20
Heavy Composition	21 @ 23
Old lead, solid	6½ @ 7
Tea lead	6
Wrought iron	1¾ @ 1¾
Sheet Iron	1 @
Cast iron	1 @ 1¼
Machinery iron	1¾ @ 1¾
Zinc	6
Pewter, No. 1	26 @ 27
" No. 2	10 @ 12
Spelter	7

Paints, Oils, etc.

Paints.

Black, lamp—Coach Painters	₩ lb 20c
" Ordinary	6c
" Ivory Drop, fair	15c
" " best	26c
Black Paint, in oil	kegs, 8c.; asst'd cans, 11 c
Blue, Prussian, fair to best	50 @ 75c
" " " in oil	35 @ 65c
" Chinese, dry	83c
" Ultamarine	25 @ 30c
Brown, Spanish	1½c
" Van Dyke	9c
Carmine, 40	$12 00
Green, Chrome	15 @ 23c
" " in oil	18 @ 25c
" Paris	good, 30c; best, 40c
" " in oil	" 30c; " 45c
Mineral Paints	1½ @ 4c
Orange "Ucrem"	14½c
Red Lead, American	9½c
" " English	10½c
" Venetian (N. C.) dry	2½ c
" " in oil	asst'd cans, 11c; kegs, 8½c
" Indian, dry	40c
Rose Pink	18c
Sienna, American, Raw	4c
" Burnt	4½c
" " in oil	16 @ 26c
" Raw "	15 @ 25c
Umber, Burnt	4 @ 8c
" " in oil	16 @ 21c
" Raw	3½ @ 7½c
" " in oil	16 @ 22c
Vermillion, Chinese	81 45
" English	1 40
" Trieste	1 38
" American, Common	23c
White Lead, American, pure dry	11½c
" " " in oil	12 c
White, Paris, English, prime	in bbls. 2½ @ 2¾c
Yellow Ochre French	2½ @ 2¾c
" " in oil	asst'd cans, 11c; kegs, 8½c
" Vermont	in casks 1½c
" Chrome	17 @ 21c
" " in oil	18 @ 28c
Zinc White, American No. 1 dry	9c
" " 1, in oil	11c
" French (Paris)	11 c
" " in oil	12 c

Oils.

Linseed Raw	₩ gal. casks, $1·00; bbls, $1·01
" Boiled	" $1·05 " $1·06
Whale, Crude	"
" Bleached Winter	"
Sperm, Crude	"
" Winter unbleached	"
" " Bleached	" 1·80
Seal, Extra Refined	" 87½c
Lard, Pure Winter	" 89c
" Spring	" 76c
Cotton seed, Crude	" 55c
" Southern Yellow	" 65c
" White	" 72c
Neatsfoot, Winter	1·10 @ $1·20
Natural Lubricating	bbls, 45c

Sundries.

Asphaltum	9c
Benzine	₩ gal. 16c
Chalk	1½c
" Block	
Dryer, patent, Am'n	asst'd cans, 10½c.; kegs, 9c
" " English	" 11c.; " 9c
Flocks	
Frostings	50c
Glue, White	33 @ 47c
" Sheet	20c
Glaziers' Points, Zinc	9c
Gum, Copal	36c
" Damar	25c
" Shellac, English	66c
" " dark	46c
Litmus	10c
Pumice Stone, selected Lumps	4 @ 6c
" " powdered	4c
Putty in bladders	3½c
" in bulk	3c
Rotton Stone, soft, English	8c
Spirits Turpentine	42c
Whiting, Spanish	1½c

Glass.

French Window—1st, 2d, 3d, and 4th qualities. Per box of 50 feet.

SINGLE.

SIZES.	I.	II.	III.	IV.
6 x 8 to 7 x 9	$8·00	$7·00	$6·75	$6·00
8 x 10 to 10 x 14	8·50	8·00	7·25	6·50
10 x 15 to 12 x 16	9·00	8·50	8·00	6·75
13 x 16 to 16 x 20	9·50	9·00	8·50	7·75
15 x 22 to 15 x 30	11·75	10·50	10·00	8·00
16 x 30 to 22 x 30	14·25	12·25	11·00	9·50
15 x 38 to 22 x 36	15·00	13·50	12·00	
24 x 36 to 24 x 40	15·75	14·25	12·50	
28 x 38 to 28 x 42	16·25	14·75	13·25	
28 x 44 to 28 x 50	17·25	15·75	14·25	
30 x 50 to 30 x 54	20·50	17·00	15·50	
32 x 54 to 34 x 56	21·50	19·25	17·50	
34 x 58 to 34 x 60	22·00	21·50	20·25	
36 x 60 to 40 x 60	26·50	24·25	23·00	

DOUBLE.

SIZES.	I.	II.	III.	IV.
6 x 8 to 7 x 9	$13·00	$12·00	$11·50	$10·00
8 x 10 to 10 x 14	14·00	12·75	12·00	10·75
10 x 15 to 12 x 16	15·00	14·00	13·25	11·25
13 x 16 to 16 x 20	16·00	15·00	14·00	12·50
15 x 22 to 15 x 30	20·00	17·50	16·50	13·25
16 x 30 to 22 x 30	22·00	19·25	17·75	15·00
15 x 38 to 22 x 36	24·75	20·50	19·25	
24 x 36 to 24 x 40	24·75	22·50	20·00	
28 x 38 to 24 x 42	26·00	23·50	21·00	
28 x 44 to 28 x 50	27·50	25·50	23·50	
30 x 50 to 30 x 54	31·00	26·50	24·00	
32 x 54 to 34 x 56	32·50	28·00	26·50	
34 x 58 to 34 x 60	34·50	33·00	31·00	
36 x 60 to 40 x 60	39·50	36·50	35·00	

Sizes above—$12·00 per box extra for every 5 inches.
Discount to the trade 50 per cent.
An additional 10 per cent. will be charged for all Glass more than 40 inches wide. All sizes above 52 inches in length, and not making more than 81 united inches, will be charged in the 84 united inches bracket.

A. C. Downing & Comp'y,

Importers of and Dealers in

Window Glass,

FRENCH PICTURE

And Car Glass, etc.

Estimates given by mail.

57 Beekman & 87 Ann Sts

NEW YORK.

Houston's Pat. Turbine Water Wheel.

Simplest, Strongest, Cheapest, Best.

In the test at Holyoke, in 1872, the Houston gave the **highest percentage ever shown** in a reliable test, and the **highest average results ever obtained.** In practical use it is everywhere demonstrating its superiority over all others. Emerson's full report furnished on application.

Send for Circular.

MERRILL & HOUSTON IRON WORKS

Beloit, Wis.

The American Turbine Water Wheel

Recently improved, and submitted to thorough scientific tests, by James Emerson, showing the following useful effect of the power of the water utilized, being the highest results ever known.

PERCENTAGE OF PART GATE.					Per cent. of whole Gate.
¼	⅜	½	¾	⅞	
50·08	69·64	78·73	82 53	82·90	83·14

A full report may be obtained of

STOUT, MILLS & TEMPLE, Dayton, O.

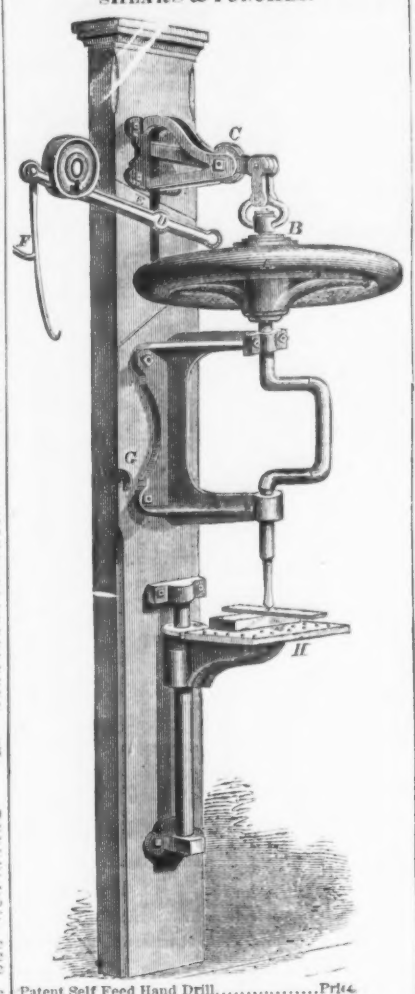
Hardware.

BIDDLE MFG. CO.,

102 Chambers Street, N. Y.,

Fine Tools & Hardware Specialties

IMPROVED DRILL PRESSES, SHEARS & PUNCHES.



Patent Self Feed Hand Drill.....Price.
Patent Self Feed Power Drill, Single Speed, Counter Shaft and Pulleys complete.....Price.
Patent Self Feed Power Drill, Three Speeds, Counter Shaft and Pulleys complete.....Price.
Send for Illustrated Catalogue and Price List.

Sole agents for the Pacific Coast,

Conroy, O'Connor & Co., SAN FRANCISCO, C

THE

Peck, Stow & Wilcox Co.,

MANUFACTURERS OF

TINNERS'

Tools and Machines,

AND

GENERAL HARDWARE

97 Chambers Street, New York.

FRANKLIN S. MILES,

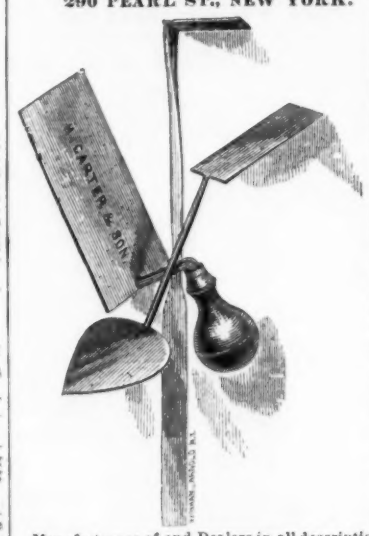
Manufacturer of

Brass, Iron, Steel and German Silver SCREWS.

Quarry Street, Philadelphia.

H. CARTER & SON,

290 PEARL ST., NEW YORK.



Moulders' and Plasterers' Tools.

Manufacturers of and Dealers in all descriptions of Moulders' and Plasterers' Tools, and Dealers in General Hardware, Gilded Copper Weather Vanes.

CARTERS' PATENT CARRIAGE LIFTING JACK, &c.

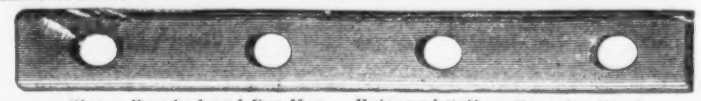
Hardware.

PRATT & CO.,

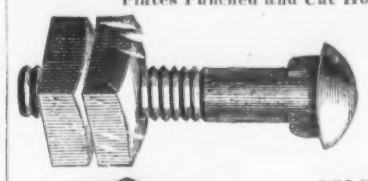
BUFFALO IRON and NAIL WORKS, Buffalo, N. Y.

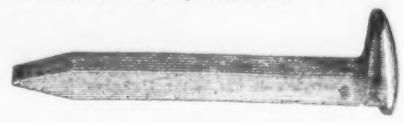
Branch Office, 55 Chambers Street, New York.

Manufacture Bar, Angle, and Plate Iron, Spikes and Nails, Railroad Fish Plates, Bolt and Spikes, Railroad and Contractors' Supplies in general, Bolt Blanks, Coach Screws "Adams Nut Lock."



Plates Punched and Cut Hot. Bolts and Spikes, Superior Stock





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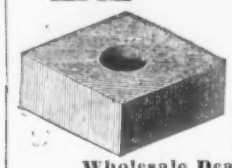

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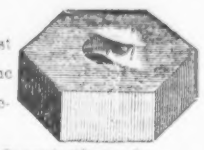

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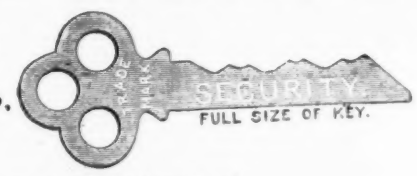

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Ætna Nut Co., Southington, Conn.....14
Arms, Bell & Co., Youngstown, O.....14
Carpenter David, 402 Water, N. Y.....4
Clark Bros. & Co., Milldale, Conn.....12
Fuller, Lord & Co., Boonton, N. J.....4
Huskell W. H. & Co., Pawtucket, R. I.....14
Lewis, Oliver & Phillips, Pittsburgh and N. Y.....14
Plumb, Burdict & Barnard, Buffalo, N. Y.....36
Rhode Island Nut Co., 11 Warren, N. Y.....14
Sternbergh J. H., Reading, Pa.....14

Oilers, *Makers of.*
White J. H., Newark, N. J.....30

Ore Crushing Machines, *Makers of.*
Blake Crusher Co., New Haven, Conn.....34

Paints and Oils, *Dealers in.*
Devoe F. W. & Co., 117 Fulton, N. Y.....

Patent Adjustable Elbows.
Sargent, Greenleaf & Cole, 300 Broadway, N. Y.....23

Patent Solicitors.
Bowson & Son, Phila. and Washington, D. C.....33
Leggett & Leggett, Washington, D. C.....36
Stetson Thomas D., 16 Murray, N. Y.....29
Whitney J. A., 128 Broadway, N. Y.....33

Picture Nails, etc., *Manufacturers of.*
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Pipes, Fittings, etc., *Makers of.*
Eaton & Cole, 58 John, N. Y.....8
McNab & Harlin Mfg. Co., 56 John, N. Y.....8
Nelson, Finkel & Co., 439 E. 10th st., N. Y.....8
Pancoast & Maule, 227 Pear, Phila.....8
Chas. Gregg Mfg. Co., 62 and 64 Gold, N. Y.....8

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National Tube Works Co., 78 William, N. Y.....8
Starr Jesse W. & Sons, Camden, N. J.....6
Warren Foundry & Mach. Co., Phillipsburg, N. J.....8
Wood R. D. & Co., 173 Broadway, N. Y.....6

Plane Irons, *Manufacturers of.*
Middletown Tool Co., Middletown, Conn.....12
Sandusky Tool Co., Sandusky, O.....30

Planes, *Manufacturers of.*
Greenfield Tool Co., Greenfield, Mass.....16
Ohio Tool Co., Columbus, O.....9
Sandusky Tool Co., Sandusky, O.....30
Stanley Rule & Level Co., 55 Chambers, N. Y.....30

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N. Y. Black Lead Works, 172 Forsyth, N. Y.....36

Plumbers' Materials, *Manufacturers of.*
Carr Wm. S. & Co., 106 Centre, N. Y.....9

Presses, Power. *Makers of.*
Am. Saw Co., 1 Ferry, N. Y.....36
Peck Milo & Co., New Haven, Ct.....28
The Stiles & Parker Press Co., Middletown, Ct.....26

Pressure Blowers. *Makers of.*
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Sturtevant B. F., 72 Sudbury, Boston.....35

Publishers.
Burr J. B. & Hyde, Hartford, Conn.....10

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Douglas W. & B., Middletown, Conn.....1
Rumsey & Co., Seneca Falls, N. Y.....1
Union Mfg. Co., 55 Chambers, N. Y.....7
Valley Mch. Co., Easthampton, Mass.....7

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Congreve Chas. & Son, 104 and 106 John, N. Y.....32
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Milwaukee Iron Co., Milwaukee, Wis.....6
Springfield Iron Co., Springfield, Ills.....4
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Joliet Iron & Steel Co., Joliet, Ills.....6

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Thomas Morton, 15 Murray, N. Y.....8

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Flint J., Rochester, N. Y.....10
Disston Henry & Sons, Phila.....10
McNeice Wm., 515 Cherry, Phila.....10
James Ohlen, Columbus, O.....10
Peace Harvey W., Williamsburg, N. Y.....10
Spear & Jackson, 116 Duane, N. Y.....27
Wheeler, Madden & Clemson, Middletown, N. Y.....10
Woodrough & McParlin, Cincinnati, O.....10

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Wilson Sewing Machine Co., 707 Broadway, N. Y.....20

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Shepard Sidney & Co., Buffalo, N. Y.....26

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Sanderson Bros. & Co., 16 Cliff, N. Y.....32
Sanderson Geo. & Co., 57 John, N. Y.....32
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W. Hawksworth, Ellison & Co., 72 John, N. Y.....32

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Hussey, Wells & Co., Pittsburgh.....5
Miller, Barr & Parkin, Pittsburgh.....32
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Reiter, Lavelly & Co., Pittsburgh.....33
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Shepard Sidney & Co., Buffalo, N. Y.....23

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Morse Twist Drill & Mach. Co., N. Bedford, Mass....34

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Grundy & Kenworthy, 165 Greenwich, N. Y.....31
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Loring Samuel, Plymouth, Mass.....31

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Dudgeon Richard, 24 Columbia, N. Y.....28

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White Lead, *Manufacturers of*
Brooklyn White Lead Co., 89 Maiden Lane, N. Y.....29
Colgate Robert & Co., 287 Pearl, N. Y.....29
Cornell Lead Co., Buffalo, N. Y.....29
Jewett John & Sons, 182 Front, N. Y.....29
Lewis John T. & Bros., 231 S. Front, Phila. Pa.....29
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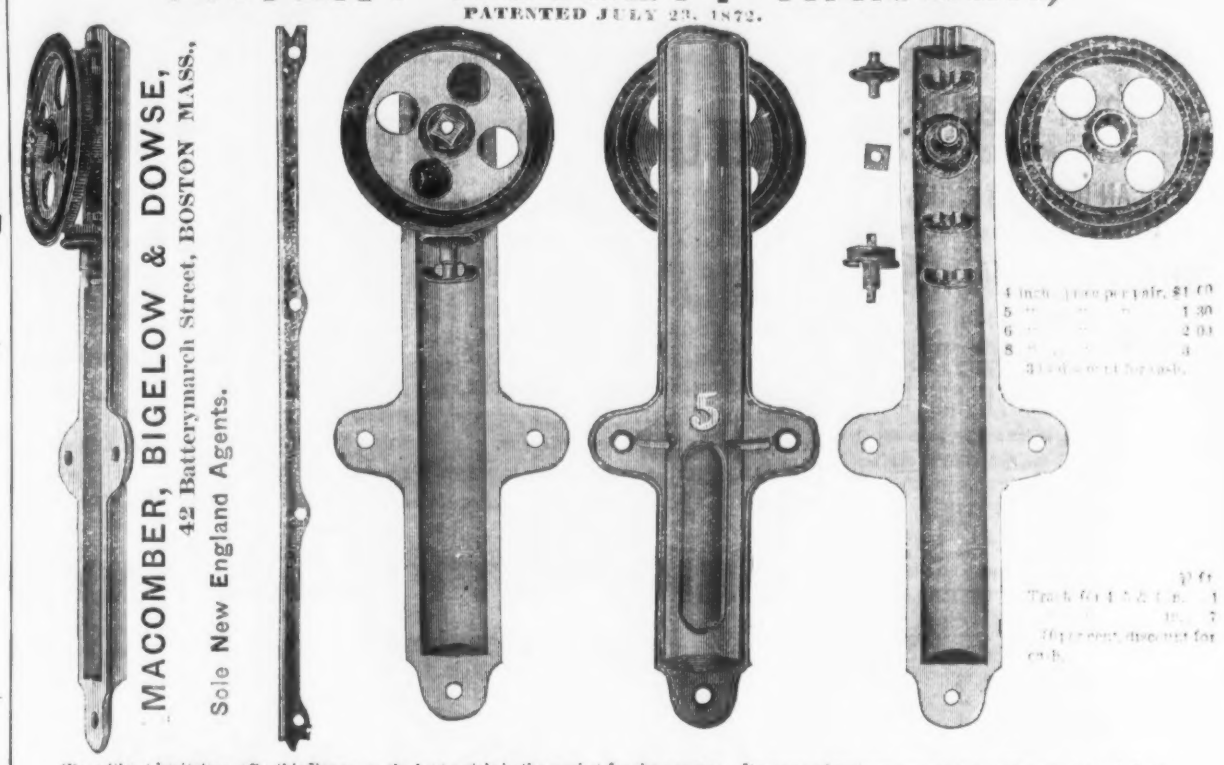

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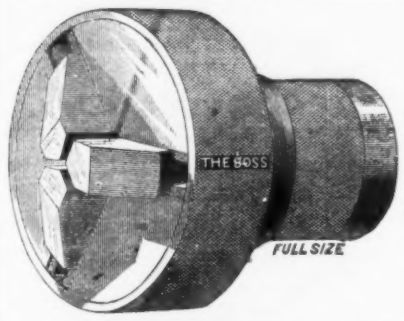

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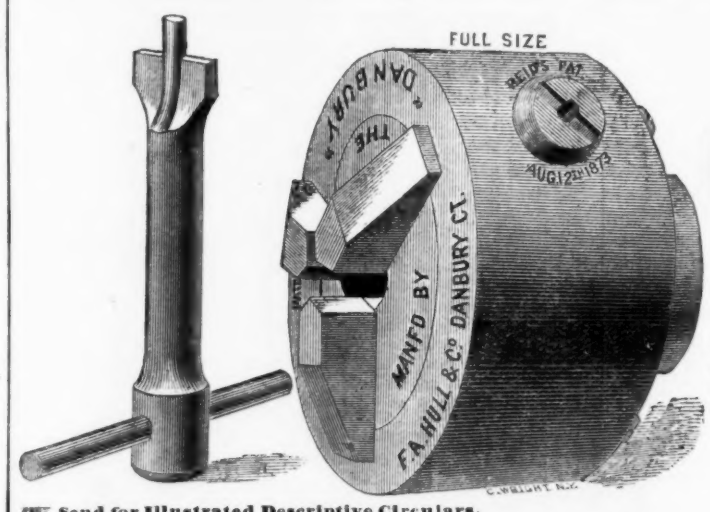

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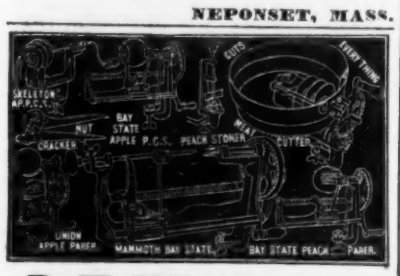

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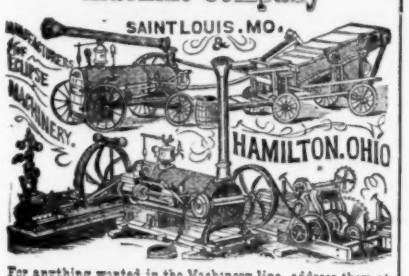

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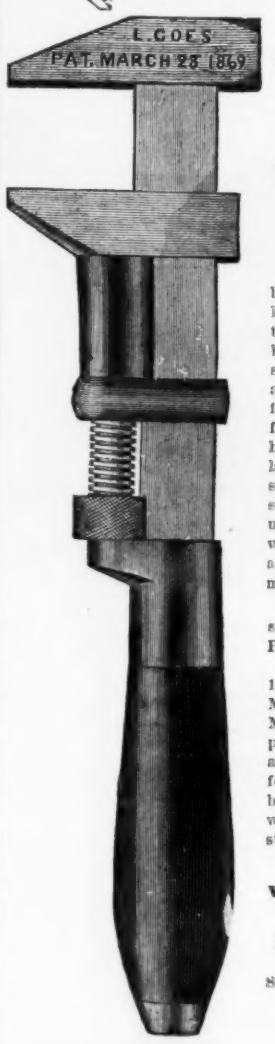

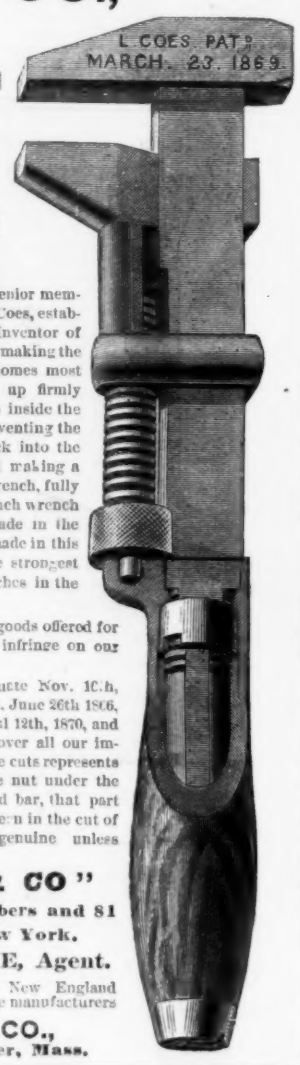

Our Mr. L. Coes, formerly senior member of the firm of L. & A. G. Coes, established in 1829, is the Original Inventor of the Screw Wrench, and has, by making the bar *wider*, where the strain comes most severe, and screwing a nut up firmly against four *square* shoulders inside the ferrule, thereby *effectually* preventing the ferrule from being thrust back into the handle or getting loose, and making a larger screw than in the old wrench, fully succeeded in making a 12 inch wrench stronger than a 15 inch made in the usual manner. All sizes are made in this way, and are undoubtedly the strongest and best finished Screw Wrenches in the market.

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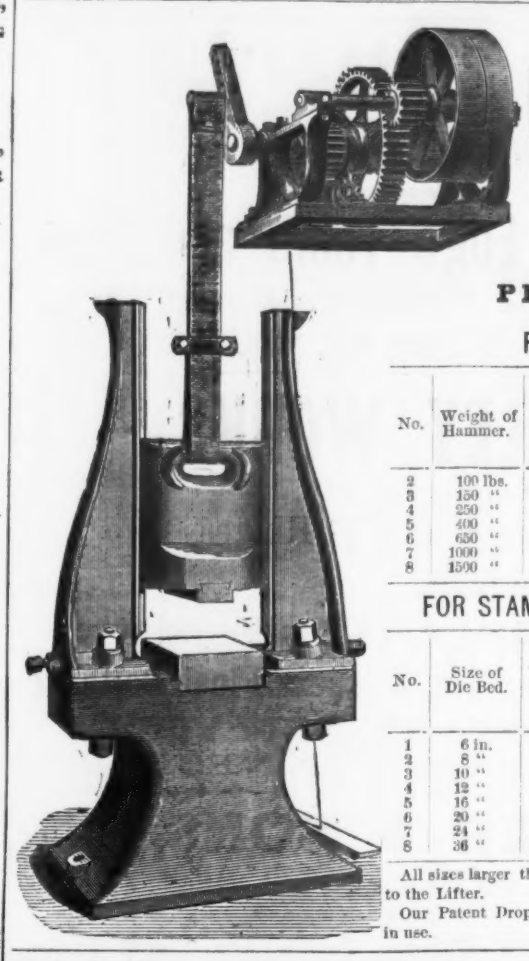

Peck's Patent

Drop Press

MILO PECK & CO.

SOLE MANUFACTURERS.
NEW HAVEN, CONN

PRICE LIST.

FOR FORGING.

No.	Weight of Hammer.	Distance between Uprights.	Lift of Hammer.	Price Complete.
2	100 lbs.	8 in.	24 in.	$ 320 00
3	150 "	10 "	30 "	467 00
4	250 "	12 "	30 "	750 00
5	400 "	16 "	30 "	900 00
6	650 "	16 "	30 "	1200 00
7	1000 "	16 "	30 "	1800 00
8	1500 "	16 "	30 "	2500 00

FOR STAMPING SHEET METALS.

No.	Size of Die Bed.	Weight of Hammer.	Price of Drop without Lifter.	Price of Lifter.
1	6 in.	50 lbs.	$ 137 50	$ 82 50
2	8 "	100 "	212 50	137 50
3	10 "	150 "	300 00	220 00
4	12 "	250 "	400 00	340 00
5	16 "	400 "	550 00	430 00
6	20 "	650 "	750 00	520 00
7	24 "	1000 "	1280 00	630 00
8	36 "	1500 "	1850 00	850 00

All sizes larger than No. 3 have Wrought Iron Cranks to the Lifter.

Our Patent Drop Lifter can be applied to any Drop in use.

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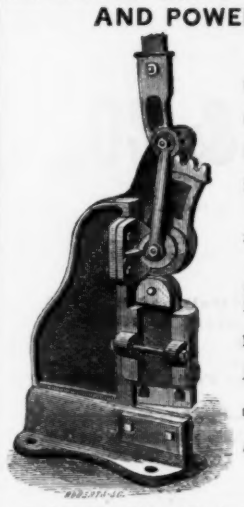

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Round Bar Hand Shear, cuts round iron, ⅜ to 1⅛ inch.....Price, $ 6 to $100
Square Bar Hand Shear, cuts square iron, ¾ to 1 inch.....Price, 20 to 100
Flat Bar Hand Shear, cuts ¾x1-16 to 2x⅜.....Price, 7 to 45
Plate Iron Hand Shear, cuts boiler plate any width, 3-16 to ⅜.....Price, 42 to 120
Hand Punch Press, punches ½x⅜ to ½x⅝ ....Price, 25 to 200
Combined Hand Punch and Round and Flat Bar Shear, punches 1-16x1-16 to ⅜x⅜, cuts round iron ⅜ to ¾, cuts flat bar 2x⅜ and under.....Price, 15 to 160
Hand or Power Plate Iron Shear, cuts ⅜ boiler plate any width.....Price, 175 to 220
Hand or Power Punch Press, punches ⅝x⅜ to ⅝x⅝.....Price, 220 to 330
Power Round Bar Shear, cuts 1¼ and smaller sizes.....Price, 175 to 275

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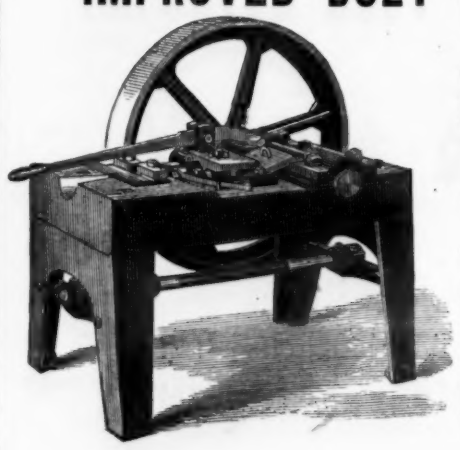

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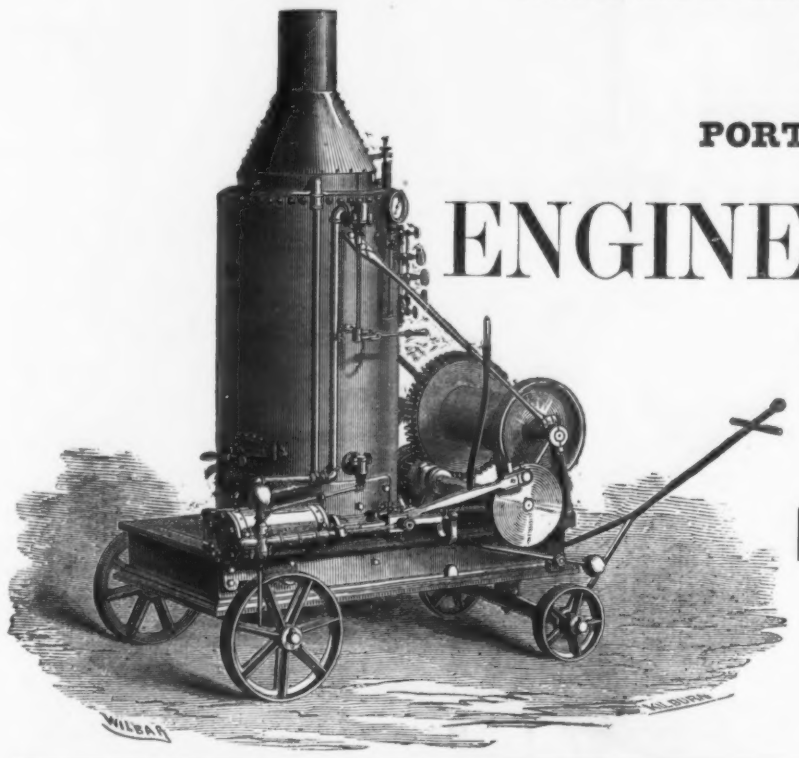

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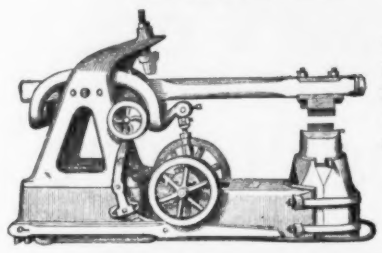

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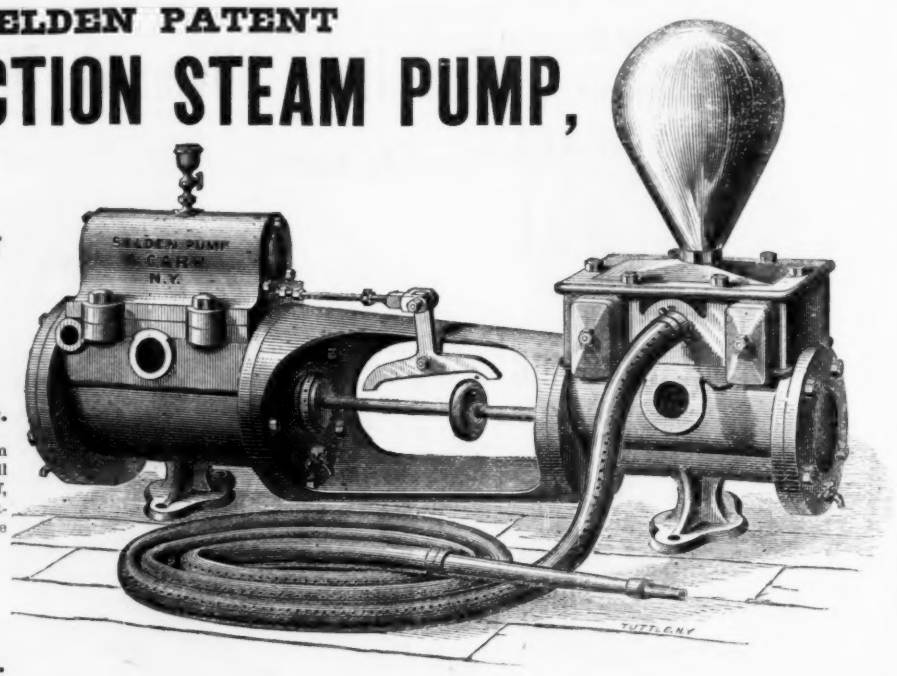

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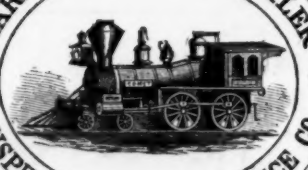

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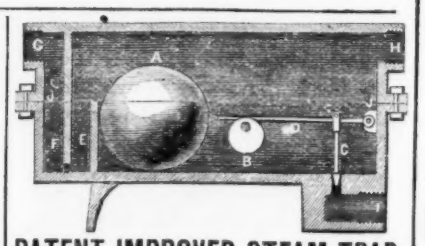

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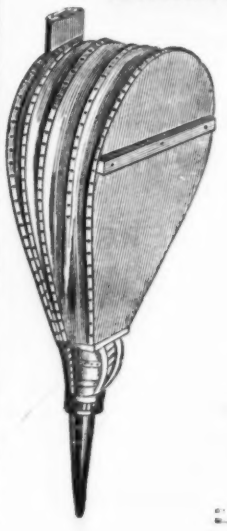

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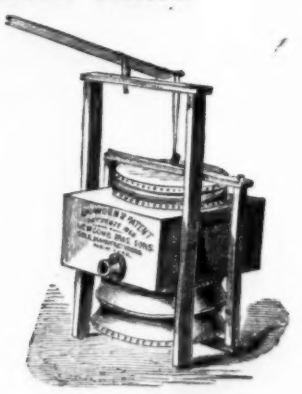

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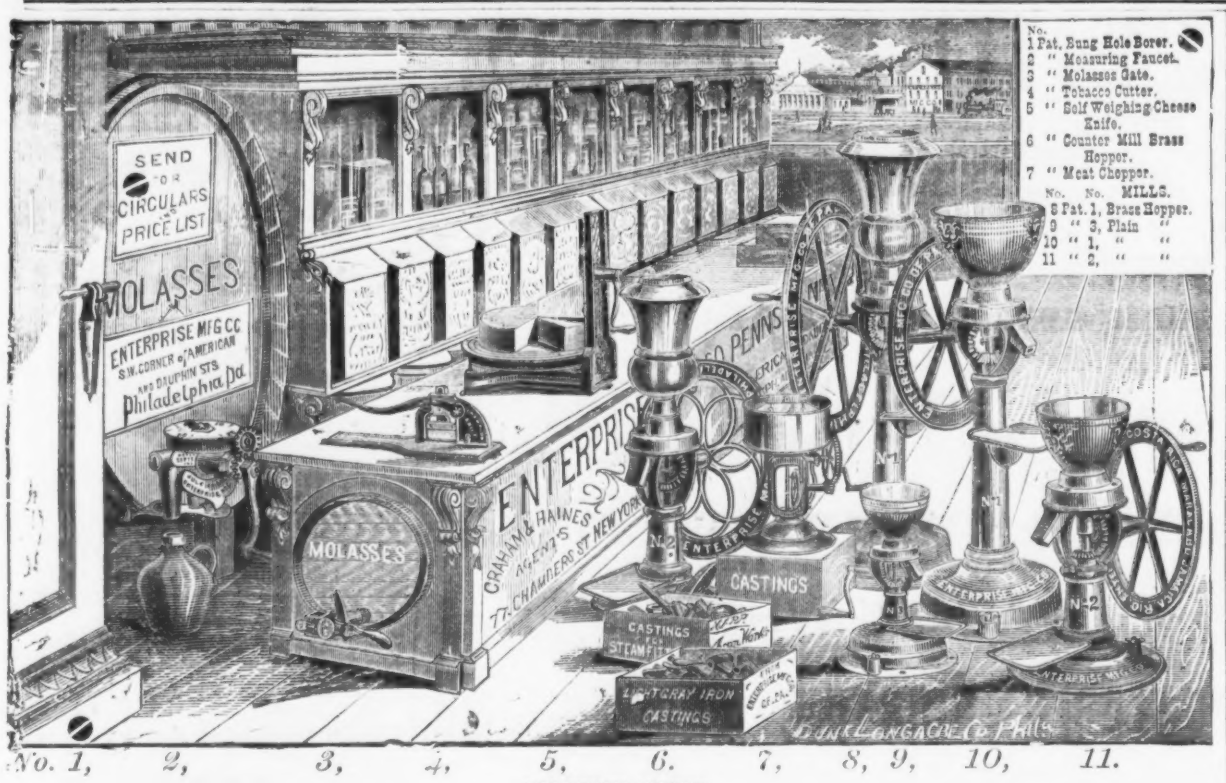
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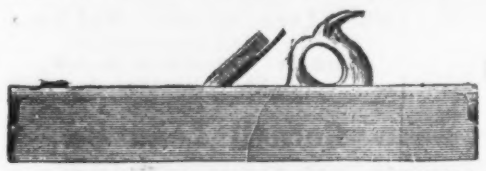

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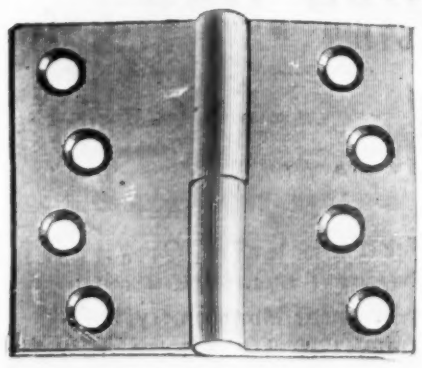

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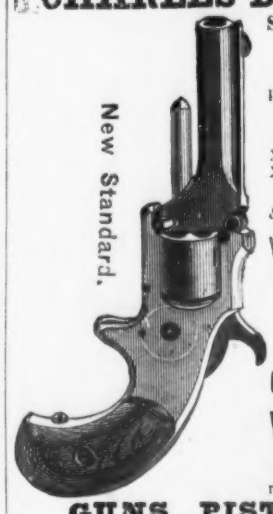

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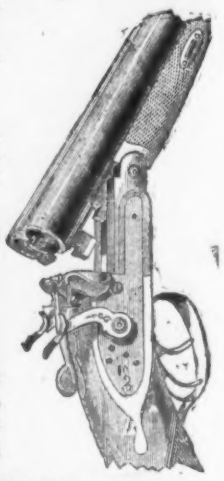

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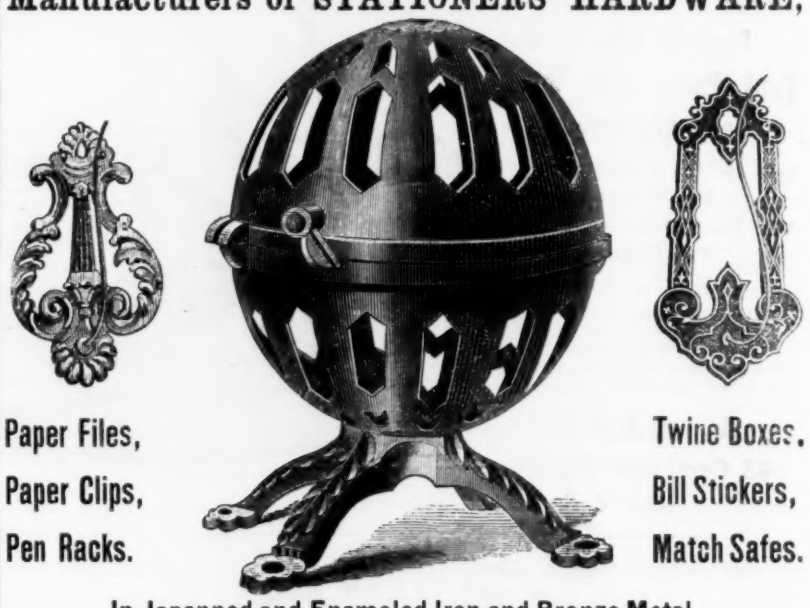

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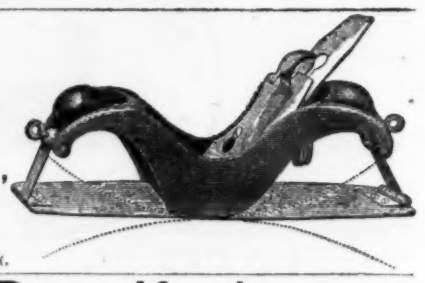
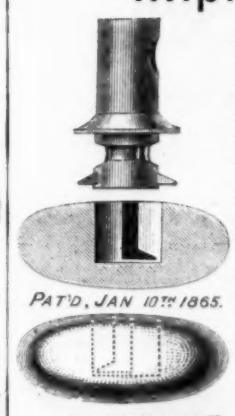


Improved Door Knobs.



On the 10th January, 1865, we obtained Letters Patent for improved method of securing necks to Mineral and Porcelain Door Knobs, which improvement was used by us long enough to prove its utility, but on account of unsettled claim of joint ownership by former partner, its use was discontinued. Having now made a further improvement, for which we have made application for a Patent, we are now making the **BEST SECURED** and **MOST DURABLE** Mineral and Porcelain Door Knobs ever offered in this or other markets.

We solicit orders for these Knobs at our regular prices for old styles, with the understanding that if any can be loosened from or gotten off the necks without breaking the tops, they may be held by the purchaser subject to our order, with expenses added.

See *The Iron Age*, of August 21st., page 11, for reduced list prices on Locks and Latches; also, for illustrated description of our patent **Telescope Locks and Latches**, with patent Flat **Steel Perforated Keys,**

Address

BRANFORD LOCK WORKS,

Branford, Conn.

Or THE HART, BLIVEN & MEAD MANUFACTURING CO., Agents,

18 & 20 Cliff and 243 & 245 Pearl Streets, New York.

PHILADELPHIA.

(Corrected weekly by Lloyd, Supplee & Walton).

Terms, 30 days. For 60 or 90 days, interest added at 10 per cent. per annum.

Anvils.—Solid Cast Steel.....₩ ℔ 12½c
Peter Wright's.....₩ ℔, gold, 13c @ 12½c
Wilkinson's.....11½c
Eagle.....₩ ℔ 12 cents, currency—dis 10 @ 15 %
Apple Parers.—Reading Improved.....per doz $8 50
Victor, Improved..... " 8 25
Union, " ..... " 8 00
Turn Table, " ..... " 8 50
Discount for 25 dozen lots..... " 50c
Axes.—Mann's Light.....Per doz. $13 00 @ 14 00
Hunt's Light..... " 14 00 @ 14 50
Red Indian, all sizes..... " 12 50 @ 12 00
Red Chieftain, all sizes..... " 12 50 @ 13 00
Crown Prince..... " 13 50 @ 13 00
Augers and Auger Bits.—Pierce's Pat.
Twist Bits.....dis 25 %
Bates' & Ives' Bits.....dis 25 @ 30 %
Douglass' Bits.....dis 25 @ 30 %
Cook's Bits.....dis30 @ 30&10 %
Bonney's Pat. Hollow Augers.....dis 25 %
Russell Jennings' Bits.....dis 10 %
Bates' & Ives' Nut Augers.....dis 20&10 %
Douglass' Nut Augers.....dis 30 %
Watrous' Ship Augers.....dis 10 %
Balances.—Landers, Frary & Clark's.....dis 10 @ 15 %
Chattillon's.....dis 10 @ 15 %
Morton's.....dis 10 @ 15 %
Common Spring, with Hook.....₩ doz $1 38 @ 2 00
Bells.—Bevin Bros. Mfg. Co. Hand Bells.....dis 50&10 %
" Extra Light Hand Bells.....dis 60 %
Other makers light.....dis 55 @ 60 %
Connell's Door Bells.....old list net
Western and Kentucky.....dis 50 %
Boring Machines.—Bates' Mfg. Co., complete with augers.....dis 10 @ 15 %
Douglass' Mfg. Co., complete with augers..dis 10 @ 15 %
Common Augers.....$4 25 @ 4 00
Anguiar, Extra Auger.....5 50 @ 5 00
Bolts.—Eastern Carriage Bolts.....dis 70 %
Western " " .....dis 70 %
Philadelphia " " .....dis 40&5 %
Wrought Shutter Bolts.....dis 45 %
Cast " " .....dis 35 %
Braces.—Barber's.....dis 40 %
Bartholomew's.....dis 10 @ 15 %
Spofford's.....dis 37½ %
Butts.—Cast Fast Joint, Narrow.....dis 40 %
" " Broad.....dis 40 %
Cast Loose Joint.....dis 50 %
" Acorn Drilled.....dis 40 %
Wrought Loose Pin.....dis 30&5 %
" Table Hinges and Back Flaps.....dis 25&5 %
" Narrow.....dis 30&5 %
" Loose Joint.....dis 35&5 %
Parker's Blind Butts.....dis 40 %; by the case, dis 40&10 %
Shepard's " " .....
Clark's " " .....
Garretson's " .....dis 45 %; by the case, dis 50 %
Lull & Porter's " .....dis 25&10 %
Chains.—German Halter.....gold list dis 20 @ 25 %
" Coil.....gold list dis 20 @ 21 %
Galvanized Pump.....₩ ℔ 15c
Best Proof Coil Chain—

₩ ℔.....	13¾	10¾	10	9½	9¼	9	8¾c gold
	3-16	¼	5-16	⅜	7-16	½	⅝ in.

By the cask, 500 lbs., discount ½c per lb. Common Chain, ½c per lb. less than proof.
Chisels.—Socket Framing.....dis 60 @ 60&5 %
Socket Firmer.....dis 60 @ 60&5 %
Tang " .....dis 40 @ 40&5 %
Beaty's Framing and Firmer.....dis 10 @ 10&5 %
Casters.—Porcelain Wheel.....dis 20&10 %
Iron.....dis 20&10 %
Brass.....dis 20&10 %
Clothes Wringers.—Universal.....per doz $72 00
Novelty..... " 72 00
Reliance..... " 72 00
Providence..... " 72 00
Orders for 5 dozen, discount $3 per dozen.
King Wringers (Iron Frame).....per doz $68 00
Coffee Mills.—Common Box and Side.....dis 10 @ 15 %
Patent Box and Side.....dis 10 @ 15 %
Cutlery.—American Pocket (best).....dis 20 @ 25 %
Landers, Frary & Clark, J. Russell & Co. and Lamson & Goodnow Mfg. Co. Manufacturers' net prices.
Drawing Knives.—Hart Mfg. Co.'s.....dis 60 @ 60&5 %
Concave Adjustable Handle.....dis 10 %
Beaty.....dis 10 %
Files.—Nicholson Mill Files.....new list, $5 00 to £ cut
Nicholson Bastard..... " 5 00 to £ cut
" Taper..... " 5 00 to £ cut
Butcher's Mill.....$5 75 to £ gold
" Bastard..... 5 50 to £ gold
" Taper..... 5 50 to £ gold
Moss & Gamble—Mill, Taper and Bastard.....5 50 @ 5 25 to £ gold
Fluting Machines.
Royal, No. 1, 4½ inch Rollers.....list $6 00
" No. 2, 6 " " .....list 7 00
Hammers and Hatchets.
Yerkes & Plumb's.....dis 10 %
Hammond & Son's.....dis 5 %
Beatty's.....dis 10 %
Hinges.—Strap and T.....dis 30&7½ %
Bonney's No. 1 Gate.....dis 25 %
" No. 2 and 3.....dis 35 %
Horse Nails.

	Nos.	6	7	8	9	10
Ausable		27	25	24	23	22
Globe		29	26	25	24	23
Brundage		26	24	23	22	21
	Nos.	5	6	7	8	9
Putnam		32	29	26	25	24

On Ausable, Globe and Brundage 1000 ℔ lots.....dis 5 %
Knobs.—Door (regular manufacture).....dis 40 %
Porcelain and Mineral.....dis 40 %
Locks and Latches.—Rim and Mortise.....dis 40 %
Till and Cupboard.....dis 25 %
American Padlocks.....dis 40 %
Trunk Locks.....dis 5 @ 10 %
Thumb and Roggens Latches.....net @ dis 10 %
Mattocks.—Long and Short Cutter.....dis 15 %
Western Pattern.....dis 15 %
Pennsylvania Pattern.....dis 15 %
Molasses Gates.
Enterprise Mfg. Co.'s Measuring Faucets.....dis 20 %
Stebbins' Gates.....dis 60 @ 60&10 %
Lincoln's " .....dis 40 @ 40&10 %
Landers, Frary & Clark's Petroleum...dis 10 @ 10&10 %
Taylor's Petroleum Faucets.....dis 20 @ 20&10 %
Rakes.—Cast Steel Garden.....dis 30 %
Malleable Garden.....dis 33⅓ %
Wood Head Iron Teeth.....dis 30 @ 40 %
Rules.—Stanley Rule and Level Co.....dis 60 @ 60&10 %
Steven's and Hubbard's.....dis 60 @ 60&10 %
Squares.—Steel and Iron, new list.....dis 50 %
Saws.—Disston's Cross Cut.....dis 12½ %
Disston's Hand.....dis 12½ %
W. McNeece's H'd, Cross-Cut & Circ'r, new list..dis 15 %
Boynton's Lightning, new list.....dis 30 %
Shovels and Spades.
Rowland's Plain Back, list Feb. 1873.....dis 20&10 %
" Back Strap " .....dis 20&10 %
Oliver Ames & Sons.....net list
Brady Shovel Co.....dis 7½ %
Sad Irons.—Reading (planed face).....per lb. 4¼c.
Coquanock (polished face)..... " 4¾c.
Stove Polish.—Gem.....₩ gross, $5 00
Onyx..... " $5 00
Scythes.—Golden Clipper.....₩ doz. $11 50
Clipper No. 10..... 10 50
Common Scythes.....₩ doz $7 00 @ 10 00
Screws.—Iron.....new list, April 1st, 1873, dis 47½ %
Brass.....dis 50&10 %
Spoons.—
Plated Spoons, Rogers Bros.'...new list dis 30 @ 30&5 %
Britannia, Spoons.....dis 40 @ 40&5 %
German Silver.....new list dis 10 @ 15 %
" " Light.....new list dis 15&5 %
Try Squares.—Disston's.....dis 12½ %
Stanley Rule and Level Co.....dis 40&10 %
Willis Thrall, No. 2.....dis 30&10 %
Willis Thrall, No. 1.....dis 25&10 %
Tacks, &c.—Half Weight Tacks.....dis 67½ %
" " by the case.....dis 67&7½ %
Clout and Finishing Nails.....7½ %
" " by the case.....dis 7½ %
Traps.—Genuine Oneida—New house list.....dis 20 %
Imitation " " .....dis 20&10 %
Wrenches.—Coes Genuine.....dis 30 @ 30&10 %
Coes Imitation Wrought Bar.....dis 45 @ 45&5 %
" " Malleable Bar.....dis 50 @ 50&5 %
" " (Kellogg) Malleable Bar.....dis 55 @ 60 %
Tafts Pattern.....60 %
" " Kelloggs.....dis 60&10 %
Wire.—No. 0 to 18.....dis 30 %
No. 19 to 26.....dis 40 %
No. 27 to 30.....dis 33⅓ @ 25 %
Coppered 0 to 12.....dis 1 @ 20 %
Tinned Broom Wire.....dis 15 @ 20 %

BUFFALO.

Reported by Messrs. Sidney Shepard & Co.

Sept. 26 1873.

Axes, Chopping—" Francis Axe Co '.....$13 00 @ $14 50
Augers—C. S. Cut.....dis 30&10 %
Bits, Auger—Pierce s.....dis 25 %
Jennings'.....dis 10 %
Bells, Cow—Yaw's Genuine.....dis 20 %
Bellows—Smiths'.....dis 20 %
Bolts—Carriage and Tire.....dis 70&5 %
Braces, Bit—Barber's.....dis 40 %
Spofford's Patent.....dis 40 %
Brads, Cut.....dis 50&7½ %
Boards—Stove, Brooks' Patent.....dis 30 %
Butts—Brass.....dis 20 %
Cast Loose Joint.....dis 50 %
" " Pin.....dis 40&5 %
" " " Japanned.....dis 40&5 %
" " " Silver Tipped.....dis 25 %
Wrought Narrow.....dis 30 %
" Broad, Loose Joint.....dis 35 %
" Table and Back Flaps.....dis 25 %
Wrought Butts, Loose Pin.....dis 35 %
Belting—Rubber.....dis 30 @ 33⅓ %
Leather, new list.....dis 20 @ 30&5 %
Beaters, Egg, " Peerless".....per doz $4 50
Bridge—Bath (box of 3 doz) Best English.....$1 50
" Rutherford".....$1 25
Bung Borers—" Enterprise".....dis 20 %
Chalk—White, Carpenter's.....₩ gross, 60c
Red, Carpenter's " 90c
Blue, " " 90c
Crayon School " 14c
Chisels—Firmer Socket.....dis 60&10 %
Framing Socket.....dis 60&10 %
Corner Socket Chisels.....dis 60&10 %
Slick's Carpenters'.....dis 60&10 %
Castings—Malleable.....₩ ℔ 10½c
Cherry Seeders.....per doz $12 00
Elbows—Corrugated.....

	5	5½	6	7
Charcoal	$4 25	5 25	5 25	6 50
Russia	10 00	13 00	13 00	14 00

Files—Wheeler, Madden & Clemson's.....dis 42½ %
Freezers, Ice Cream—" Champion".....dis 33⅓ %
Gates—Molasses—
Patent Self-Measuring.....₩ doz., $42 00; dis 20 %
Hangings—Window Blind—
Clark's No. 20.....dis 50&5 %
Shepard's Standard, and Clark s.....dis 40&10 %
Garretson s .....dis 40, 10&10 %
Wrought Strap and T.....dis 30&7½ %
Hods, Coal—Plain, Black and Galvanized.....net @ 10 %
Funnel, Black and Galvanized.....net @ 10 %
Palace Coal Vases.....net
Fancy and Helmet.....net @ 10 %
Hammers—Maydole's.....net
Yerkes & Plumb's.....dis 5 @ 10 %
Hooks and Staples—Wrought.....dis 50 %
Hooks—Belt.....dis 50 %
Hasps and staples—Wrought.....dis 60 %
Sad Irons.....₩ ℔ 5c
Kettles—Brass.....₩ ℔, 50c
Enameled.....new list dis 40 %
Knives, Drawing—Oval No. 1.....dis 60&10 %
Razor Blade.....dis 50&10 %
Lanterns " Peerless,".....

No.	1	5	10
	₩ doz $26 00	$11 25	$13 75 dis 10 %
"Radiant" No	75	100	150 175
	₩ doz $13 13	$13 13	$22 50 $22 50 dis 20 %

Tubular.....$13 00
" with Guards.....13 50
Machines—Apple Paring, " Reading,".....$8 50 ₩ doz
Mills, Coffee—Box and Slide, common.....dis 15 %
Box Union and Eagle.....dis 15 %
" Enterprise".....dis 20 %
Nails—Cut, Chesapeake.....$4 50
Clout and Finishing.....dis 7½ %
Shoe.....dis 7½ %
Horse, Ausable.....

No.	5	6	7	8	9	10
	30	27	25	24	23	22c

" " Finished & Pointed.....add 1c ₩ ℔
" " 1000 lbs.....dis 5 %
" Clinton.....

No.	6	7	8	9	10
	22	20	19	18	17c

Packing—Rubber.....dis 30 @ 33⅓ %
Pencils, Slate—Soapstone.....4 5 6 in.
50 40 50c. ₩ 100
Case lots.....dis 20 %
Paint—White Lead, U. S. Gov't.....₩ ℔ 9½c
Rivets—Iron, Black and Tinned.....dis 20 @ 25 %
Copper.....dis 10 %
Rope—Manila, ¼ inch and larger.....₩ ℔ 17½c
Rules—Boxwood and Ivory, Stephens.....dis 50&10 %
Screws—"American Screw Co"—
Flat Head, Iron.....dis 47½ %
Flat Head, Brass.....dis 60 %
Staples—Blind, Boardman's Pat., ¼ & ⅜.....₩ ℔ 37½c
Skates—White's.....@ 8 50
Barney & Berry's—N. Y. Club Japanned Top.....$2 20
" " B. & B. Club Blued Top.....2 85
" " B. & B. all Clamp Fastening.....4 25
" " B. & B. Rink.....10 50
Straps, Skate—Russet and Black.....net @ 20
Spoons, Iron Tinned.....dis 10 %
" by the case.....dis 20 %
Plated Rogers' A No. 1.....dis 20&5 %
Britannia " .....dis 40 %
Squares—Steel and Iron.....new list 50 %
Shoes, Horse—H. Burden & Sons.....₩ keg $6 50
Shovels & Spades—Shepard, Forsyth & Dennison..dis 20 %
Saws—Henry Disston & Sons.....dis 10 %
Scales—Buffalo Scale Works.....dis 25 %
Fairbanks.....dis 15 %
Shears—Seymour's.....dis 5 @ 1 %
Traps, Steel—Newhouse.....dis 20 %
Tacks—Half Weight Aun. Iron.....dis 67½&7½ %
Vises—Parallel, Buffalo.....dis 15 %
Wrenches—Coes' genuine.....dis 30&10 %
Coes' Imitation.....dis 50&10 %
Tufts' Pattern.....dis 65&10 %
Ware—French, Tinned and Iron.....
Stamped and Japanned.....
Cast Iron Hollow.....dis 30 @ 25 %
Tin Plates.—Add for each X.....2 50
10x14, IC, Charcoal...$1 75 | 14x20 C, terne.....$1 75
12x12, " 15 25 | 20x28 C, " 25 00
12½x17, " 12 50 | 20x28 X, " 25 50
14x20, " 13 75 |
Pig Tin—Straits.....29c @ 40
Banca.....45c @ 46
Bar Tin.....41c
Solder.....No. 1, 21½c; No. 2, 19½c
Sheet Zinc—
" Lasalle".....

	570	300	500	100 ℔ casks
	11 00	$11 20	$11 20	$11 50 ₩ 100 ℔s

Iron Wire—Bright and Annealed.....dis 30 %
Coppered.....dis 25 %
Tinned.....dis 15 %
Tinned Broom, Nos. 20 | 21 | 22 .....dis 20 %
20c | 21c | 21c
Copper—Sheathing 14 @ 18 oz.....₩ ℔ 37c
Planished.....₩ ℔ 44 @ 46c
Bottoms.....₩ ℔ 39c
Bolts.....₩ ℔ 40c
Braziers' Sheets.....₩ ℔ 40c
Sheet Iron.—
18 Common.....$5 80
24 Common.....6 00
24 W. D. Wood & Co., Smooth Finish.....7 25
Am. Russia.....A. B.
14c 12c
Gen. Russia, No. 1 stained.....21c
" " clean.....22c
Galvanized.....dis 30 %

PITTSBURGH.

Card Rates, 60 days.

Flat Bar —
1½ to 4 x ⅜ to 1 inch..3·8c
4¼ to 6 x ⅜ to 1 inch..4·0c
1¾ to 6 x 1⅛ to 1½ in..4·2c
Horse Shoes —
All sizes.....5·3c
Heavy Bands. —
3½ to 6 x ¼ & 5-16 in..4·4c
1¾ to 3¼ x ¼ & 5-16 in..4·5c
Light Bands.—
3 to 6 x 3-16 to No. 12..4·8c
1¾ to 2¾ x 3-16 to No. 12.....5·0c
Hoops.—2¾ to 3 in....5·1c
3½ to 4¾ in.....5·3c
1¾ to 2¼ in.....5·2c
1⅜ to 1 11-16 in.....5·4c
1¾ & 1¼ in.....5·9c
Round and Square.—
1 to 1¾ in.....3·8c
2 to 2¾ in.....4·1c
3 to 3¾ in.....4·3c
3¾ to 4 in.....4·8c
⅝ to 9-16 in.....4·2c
Oval Iron.—
⅝ to 1¾ in.....4·4c
⅜ to ⅞ in.....4·6c
1¾ & 1¼ in.....5·0c
Half Oval and Half Round.—
⅝ to 1¾ in.....4·7c
⅜ to ⅞ in.....5·2c
1 to 1¾ x 3-16 to No. 12..5·4c
1¾ to ⅞ x 3-16 to No. 12..6·0c
1 in.....6·3c
⅞ in.....6·8c
¾ in.....7·8c
⅝ in.....8·3c
½ to 7-16.....4·5c
⅜ in.....4·6c
5-16 in.....5·0c
¼ in.....5·4c
3-16 in.....7·4c

	Boiled.	Charcoal.	Jun.
Sheet Iron, 10 to 14	5·8	7·3	8·8
" 15 to 20	6·0	7·5	9·0
" 21 to 24	6·2	7·7	9·2
" 25 to 26	6·4	7·9	9·4
" 27	6·6	8·1	9·6

All sheets over 28 in. wide, ½c. ₩ ℔ extra.

Tank Iron —
3-16, ¼ & ⅝ in. thick..5·6c
Boiler Plate Iron....8·5c
Heads net flanging..6·7c
Heads flanging.....8·5c
Plow Slubs.....6·4c
Plow Wings.....6·9c
Railroad Iron—Countersunk and Punched.—
1¼ x ⅜, 7-16 & ½ in ...4·8c
1¼ x ½ & 5-16 in.....5·3c
1¼, 1⅜ & 2 x ½ & ⅝ in..4.8c
1¾ x ⅜ in.....4·5c
Extras for Cutting to Length.—
Flat bars and rounds and squares.....1c
Flat bars for tire.....1c
Heavy bands.....3c
Light bands and wagon box iron.....4c
Hoops.....5c
Nails—Standard list.....$4 50
100 keg lots 12½c. off.

The following are the Card rates of Lewis, Oliver & Phillips:

Iron, standard list, assorted sizes, for large orders, 3·8c, card rate, 2 % off net.
Iron Wedges.....5½c ₩ ℔ net
Norway Nail Rods.....9½c ₩ ℔ net
Fence Pickets—
⅜ round, bent to shape.30c ₩ ft. of fence, less 5 % off net
Discount off Standard List.
Carriage and Tire Bolts (new list).....60&15 % off net
Plow Bolts.....25 % off net
Stove Bolts.....at the list price
Machine and Square Head Bolts.....25 % off net
Coach and Lag Screws.....25 % off net
Bolt Ends.....20 % off net
Pat. Hot Pressed Square and Hexagon Nuts, small sizes, from 3-16 to ⅜ in.....6 c ₩ ℔ off net
Pat. Hot Pressed Square and Hexagon Nuts, large sizes, from 7-16 to 2 in.....4½c ₩ ℔ off net
Washers, all made from new band iron, small sizes, from 3-16 to ⅜ in.....7 c ₩ ℔ off net
Washers, all made from new band iron, large sizes, from 7-16 to 1⅜ in.....5 c ₩ ℔ off net
Nuts and Washers in 25 lb. boxes, 1c ₩ ℔ ex. Nuts and Washers in lots less than one keg each size, 1c ₩ ℔ ex.
Harrow Teeth, in lots of 1 ton or more, packed in casks, 1 in. diam. 5c ₩ ℔ net; ⅞, ¾ in. diam. 5c ₩ ℔ net; ⅝ in. diam. 5½c ₩ ℔ net.
Patent Headed Harrow Teeth, packed in casks, ½c ₩ ℔ ex
Skein Bolts, in bulk, in lots of 5 kegs or more, ⅝ in. diam. 8c ₩ ℔ net; 9-16 in. diam. 9c ₩ ℔; ½ in. diam. 10c ₩ ℔. 1c ₩ ℔ extra when less than 1 keg of each size is ordered.
Screw Hook-and-Eye Hinges, ¼ to 1 in. diam. 9½c ₩ ℔ net; ⅞ in. diam. 10½c ₩ ℔ net; ¼ in. diam. 12½c ₩ ℔ net.
Screw and Strap Hinges, in lots of 100 pairs or more, 14 to 18 in. long, 7c ₩ ℔ net; 8, 10 & 12 in. long, 6½c ₩ ℔ net.
Strap and T Hinges.....30 % off net, delivered
Screw Hitching Rings.....$6 50 ₩ 100 net
Duck Nest Tuyere Irons.....$16 00 ₩ doz net
Cast Iron Washers.....₩ ℔ 4½c net
Bridge and Roof Bolts—
1 to 2 in. diam. over 8 ft. long.....₩ ℔ 5½c net
1 to 2 in. diam. from 4 to 8 ft. long.....6½c net
1 to 2 in. diam. from 1¾ to 4 ft. long.....6 c net
⅞, ¾ and ⅝ in. diam. over 4 ft. long.....7½c net
⅞, ¾ and ⅝ in. diam. from 1¾ to 4 ft. long.....6½c net

WAGON HARDWARE.

Wagon Box Strap Bolts—
10 in. long by 7-16 at Screw End, ₩ set of 8 bolts.. 55c
12 " ½ " " 8 " .. 70c
10 " 9-16 " " 8 " .. 90c
12 " 9-16 " " 8 " ..
14 " 9-16 " " 8 " .. $1 00
10 in. long by ⅝ at Screw End, ₩ set of 8 bolts.. 1 00
12 " ⅝ " " 8 " ..
14 " ⅝ " " 8 " .. 1 10
16 " ⅝ " " 8 " .. 1 20
5c ₩ set for each additional inch over 14 in. All lengths made.
Wagon Box Rods, narrow track, each.....18c
" " wide track, each.....30c
Single Tree Irons, ₩ set of four pieces.....38c
Wrought Iron Bolster Plates, 2½ in. wide, ₩ set.....60c
" " 3 " " 65c
" " 3½ " " 70c
" " 3½ " " 75c
Wagon Brake Ratchets, each.....65c
" " " finished with guard, each..45 c
Wrought Hammer Straps, heavy pattern, each.....16 c
" " " light " each.....13½c
" Rub Irons, each.....11 c
Stay Chain Hooks, each.....8 c
Double and Single Tree Clips, figure 1, each.....9 c
" " " " 2, each.....10 c
" " " " 3, each.....12 c
Strap Bolts, Rods, Single Tree Irons, Bolster Plates, Brake Ratchets, Hammer Straps, Rub Irons, Stay Chain Hooks and Clips, in lots of 100 sets.....dis 22½ %
Wagon Box Staples, 1½ to 2½ in. to clinch, ₩ 1000 $13 50 net
" " Box Iron, to rivet on, ₩ 1000 9 50 net
Neck Yoke Eyes, each.....5½c net
" with ⅝ rings, each.....8½c net
King Bolts, ⅝, 1, 1¼, and 1½ in. diam.....₩ ℔ 5½c net
Wagon Rivets, ex. large, oval and steeple head, ⅛ in. diam. all lengths.....10 c net
Wagon Rivets, 3-16 in. diam., all lengths.....12 c net
" " & Nails, in 5 ℔ paper boxes....₩ ℔ 1c extra
" " in 25 ℔ wood " .....½c extra
Wagon and Hinge Nails, ¼ in.....₩ ℔ 17 c net
" " " 3-16 in.....19 c net
Double Tree Plates.....
Coupling " .....9 c net
Tongue " .....
Neck Yoke Plates.....12 c net
Tongue Cap Iron, 1¾, 2 & 2½ in. wide, same price ₩ ℔ as Band Iron.
Wagon Chains, Stay Lock and Tongue, 5-16 in. ₩ ℔ 11½c net; ¼ in., 12½c. net

WILLIAMS WHITE & CHURCHILL,
Successors to
MACKRELL & RICHARDSON MFG. COMPANY,
Manufacturers of
Builders' Hardware,
Locks, Hinges, Hooks and Staples,
Awning Hooks, Meat Hooks, Pincers,
Champion Noiseless Pulleys,
CHAIN PULLEYS, &c.
Factory, cor. Flushing and Nostrand Avenues, BROOKLYN.
Warehouse, 73 Warren St., N. Y.

TACKLE BLOCKS.
BURR & CO.
Manufacturers of Waterman and Russell's
PATENT IRON STRAPPED BLOCKS
ALSO, MANUFACTURERS OF
ROPE STRAPPED BLOCKS,
31 PECK SLIP NEW YORK.

Established in 1810.
HOBART'S TACKS.
Manufactured by
Dunbar, Hobart & Whidden,
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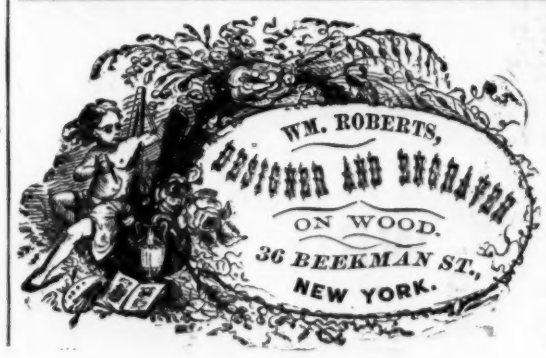

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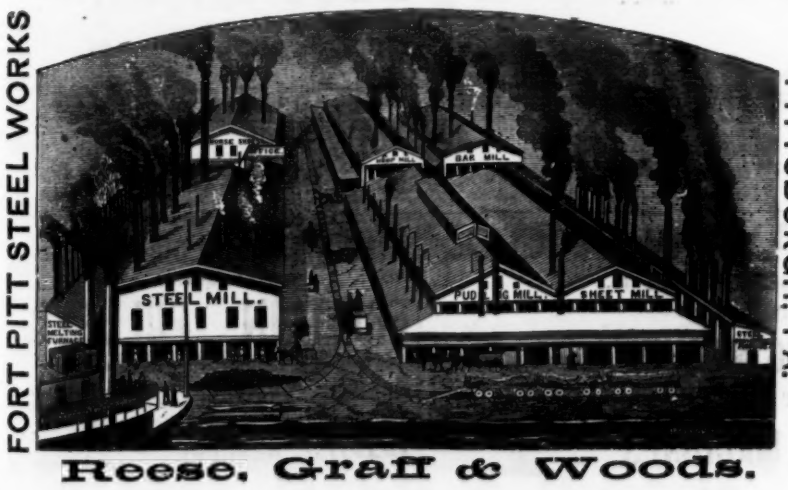

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No. 30, open ring, 3 ft., No. 6, with toggle..₩ doz $3 37
No. 35 " 3 ft., No. 6 " snap...₩ doz 3 62
No. 40 " 3½ ft., No. 5 " toggle..₩ doz 3 75
No. 45 " 3¾ ft., No. 5 " snap...₩ doz 4 00
No. 50 " 4 ft., No. 4 " toggle..₩ doz 4 25
No. 55 " 4 ft., No. 4 " snap...₩ doz 4 50
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" Saw Blades, 32 inch.....per doz $7 00
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Common " " .....per doz 6 00
Disston " " .....per doz 9 00
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Novelty and Universal, Tub No. 2, less than 5 doz..₩ doz $ 72 00
5 doz..₩ doz 69 00
10 doz..₩ doz 67 00
Moritor, Double Cogs.....per doz 68·00
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10 doz..₩ doz 101 00
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Pig Tin.—	₩ lb	Straits, gold	32c
Banca, gold	37c	English "	32c
Copper.—	₩ lb	Braziers	40c
Sheathing	38c	Ingot	28c
" Yellow	40c	Old	36c
Bolt	40c	Sheet and Pipe	45c
Lead.—	₩ lb	Old	6½c
Spanish Pig, gold	6½c	American, gold	7c
Spelter.	₩ lb		
Silesian, gold	8c		
Zinc.—Sheet			₩ lb 10½c
Iron.—Sheet Iron, Russia, gold			₩ lb 18c
Sheet Iron, English			" 7c
" " American			" 7½c
" " Galvanized			" 11c @ 13c
Swedes Bar Iron, Flat, gold			₩ ton, $145 00 @ $155 00
" Shoe Shapes, gold			155 00 @
Norway Bar Iron, Flats, gold			145 00 @ 152 00
" Shapes, gold			155 00 @
" Round, 2 in. to ⅝ in., gold			147 50 @ 122 50
" " 11-16 to ⅝ in, "			162 50 @
" " 7-16 to ¼ in. "			165 00 @
" Nail Rods, Rolled "			177 50 @
" " U. B. "			172 50 @
" " Benzon "			167 50 @
" " Vasa "			160 00 @
" " N I W "			160 00 @
English Refined Bar Iron			57 50 @
Scotch Pig Iron			40 00 @ 45 00
American "			38 00 @ 48 00
Wrought Scrap Iron			45 00 @

Steel.—	₩ lb	German	11c
Eng. Tool, gold	16c	Spring	9c
" Mach. "	10c	Tire	8c
American Tool	16c	Sleigh Shoe	6¾c
" Mach	11c	Toe Calk	8¾c
Bessemer	8½c @ 9½c		

ST. LOUIS.

Corrected weekly by Semple, Birge & Co.

Anvils.—Armitage.....₩ lb, gold, 16c
Peter Wright's....." 14½c
Wilkinson's....." 12½c
Apple Parers.—Conqueror.....₩ doz, $9 00
Lightning....." 9 00
Turn Table....." 9 00
Augers and Bits.—Cook's.....dis 25 %
Ives'.....dis 20 %
Jennings'.....dis 5 %
Snell's.....dis 12½ %
Axes.—Hunt's.....₩ doz $14 50 @ 15 50
Lippincott's....." 14 00 @ 15 00
Lippincott's Pioneer....." 14 50 @ 15 50
Simmons'....." 13 50 @ 14 50
Axles.—Kritch & Crane Mfg. Co.'s—
Patent Taper Axles.....dis 10 %
Swelled Taper Axles.....dis 10 %
Concord Axles.....dis 10 %
Red Jacket Axles.....dis 10 %
Common Axles, 1½ inch and upward.....₩ lb., 8½c
" " less than 1½ inch....." 9½c
Bells.—Troy, Church.....₩ lb., 50c
Light Brass, Hand.....dis 50 %
Moore's, Cow.....dis 10 %
Bolts.—Arms, Bell & Co.'s Machine.....dis 10 %
Arms, Bell & Co.'s Carriage and Tire...new list dis 50 %
Norway Iron Carriage and Tire.....dis 40 %
Cast Iron Barrel, Shutter, &c.....dis 25 %
Cast Butt Hinges.—Narrow Fast Joint.....dis 25 %
Broad Fast Joint.....dis 40 %
" Loose " .....dis 50 %
Reversible.....dis 45 %
" Japanned and Silver Tipped.....dis 40 %
Loose Joint "Acorn" " " .....dis 40 %
Excelsior Reversible Blind.....dis 30&10 %
Lull & Porter's Blind.....dis 25 %
Wrought Butts.—Narrow.....dis 20 %
Reversible.....dis 25 %
Broad.....dis 25 %
Table Hinges.....net list
Back Flaps.....net list
Inside Blind Hinges.....net list
Casters.—Porcel'n Wheel Bed or Plate..rev. list dis 15 %
Iron or Brass Wheel Bed or Plate.....
Chain.—Eng. Coil. 3-16 ¼ 5-16 ⅜ 7-16 ½ in.
14 11½ 10¾ 10 9½ 9c gold
Trace.....6⅜-10-2 75c "
7-10-2 80c "
German Coil and Halter.....new list add 25 % "
American Coil—Short Link.
Size, inches.....⅜ 7-16 ½ 9-16 ⅝
Price cents ₩ lb.....12½ 12¼ 10½ 10 9½ net
Size, inches.....11-16 ⅝ 13-16 ¾ 15-16
Price, cents ₩ lb.....9½ 8¾ 8¼ 8½ 8¾ net
Size, inches.....1 1 1-16 1⅛ 1 3-16 1¼
Price, cents, ₩ lb.....8¼ 8¼ 8 7¾ 7¾ net
All larger sizes same price as 1¼ in. Stud chain 1c less than same size close link.
Chisels.—Socket, Firmer or Framing.....dis 55 %
Clothes Wringers.—Colby's.....₩ doz $66 00
Novelty....." 72 00
Universal....." 72 00
Monitor....." 72 00
Coffee Mills.—Parker's.....net list
P. S. W. & Co.'s.....net
Corn Knives.—Dunn E'ge T'ol Co.'s Clip..₩ doz $5 75
Disston's....." 6 00
Crow Bars.—Steel Pointed.....₩ lb 8 @ 10c
Solid Cast Steel....." 20c
Cutlery.—J. Russell & Co.'s.....
Lamson, Goodnow & Co.'s..... } new list, dis 15 %
Landers, Frary & Clark's.....
Files and Rasps.—
Nicholson's Mill Files.....$5 50 to the £, currency
Nicholson's Other Files.....5 00 to the £, currency
Butcher's Files.....7 00 to the £, currency
Heller's & Bros. Horse Rasps...5 25 to the £, currency
Forks and Hoes.—
Auburn Mfg. Co.'s Hay and Manure Forks.....dis 25 %
" " Handled Hoes.....dis 20 %
" " Planter Eye Hoes.....add 20 %
Winsted's Planter Eye Hoes.....add 20 %
Hammers.—Yerkes & Plumb.....new list net
Masons' Hammers.....₩ lb 20c
Smith Hand Hammers....." 22c
Handles.—Axe.....Extra. No. 1. No. 2. No. 3.
$2·75 $2·25 $1·75 $1·00
Pick.....Extra. No. 1. No. 1½. No. 2.
$2·50 $2·00 $1·75 $1·25
Smith & Montross Fork, Hoe and Rake.....dis 10 %
" " Broom and Mop.....$12 @ $18 ₩ M.
Harrow Teeth.—1 inch iron.....₩ lb 5½c
⅞ and ¾ inch iron....." 5¾c
⅝ inch iron....." 5¾c
Barbed or Headed.....½c extra
Hatchets.—Hunt's.....net list
Simmons'.....dis 5 %
Hay Knives.—Lightning.....₩ doz $22 00
Dunn Edge Tool Co.'s.....₩ doz $14 50—dis 15 %
Fisher's....." 16 50—dis 10 %
Hinges.—Strap and T—St. Louis make.....dis 25 %
Horse Nails.—Eureka.....23c rates
Ausable.....22c "
Northwestern.....22c "
Eagle.....19c "
National Patent Pointed.....21c "
" Extra Finished.....22c "
Horse Shoes.—R. I. (Perkin's pat.).....₩ keg $7 00
Burden's....." 7 00
Mule Shoes.....$1 00 extra
Rhode Island Trotting Shoes.....2 50 "
Locks and Latches.—
Jones & Nimick s.....revised list dis 40 %
Moorhead, Adams & Co.....dis 40 %
Norwalk Lock Co.'s revised list.....dis 35 %
Mattocks and Grub Hoes.—
Klein, Logan & Co.'s Mattocks...₩ doz. $15 00 @ 16 00
" Grub Hoes, Oval Eye...₩ doz. 12 00 @ 13 00
Nails.—Wheeling.....$4 75 rates.
Orders for 100 kegs 10c ₩ keg less.
Picks.—Klein, Logan & Co.'s R. R. and Clay ₩ doz..$12 00
Klein, Logan & Co.'s Coal....." 9 75
" " Poll....." 12 00
" " Stone....." 16 50
" " Tamping....." 19 00
Planes.—Ohio Tool Co.'s.....dis 10 %
Eastern.....dis 20 %
Post Hole Augers.—Clark's Patent—
No. 1, ₩ doz. $27 ; No. 2, $30 ; No. 3, $32.....dis 20 %
Barton's Patent.....₩ doz $25—dis 20 %
Vaughn's " .....25—dis 10 %
Sad Irons.—Monitor Brand, Silver Polished....₩ lb 6c
Sash Weights.—Standard Solid Eyes.....₩ lb 3½c
Saws.—Disston's.....dis 10 %
Spear & Jackson's.....$5 00 to £ gold
Hubbard, Lippincott, B. & Co.'s.....dis 10 %
Branch, Crooks & Co.'s.....dis 10 %
Livingston's Patent Buck.....net list
Screws.—American Screw Co.'s revised list....dis 45 %
$2000 worth in 6 months.....2½ % extra
Scythes.—Blood's C, S. & G. S.....net list
Dunn Edge Tool Co.'s, Factory List.....dis 15 %
Paris Furnace Co.'s.....dis 25 %
Waldron's English.....$10 00 to £
Scythe Stones.—No. 1 ind'n Pond ₩ gr's, $7 00
Extra Indian Pond....." 7 50
Premium....." 9 50 } dis 25 %
Diamond Grit....." 13 50
Shovels, Spades and Scoops.—Ames'..add $1 to list
Lippincott's.....new list net
Rowland's, Maxwell.....revised list net
Sledges.—Smith s Stone or Coal Sledges—
Steel Face Polished.....₩ lb., 17c
Solid Cast Steel....." 35c
Striking Sledges.....₩ lb extra, 1c
Snaths and Cradles......dis 20 %
Springs.—Cleveland Spring Co.'s—
Carriage and Express.....dis 5 %
Blue Seat Springs.....new list dis 10 %
Tacks.—Norway Tack Co.'s ½ weight.....dis 67½ %
Brads.....dis 50 %
Traps.—Newhouse Patent.....dis 15 %
Reichard's Animal, Wood Bottom.....₩ doz $10 00
" " Metal Bottom....." 12 00
Vises.—Solid Box.....₩ lb 18c
Wilson Mfg. Co.'s.....dis 15 %
Wrenches.—Coes' Genuine.....dis 30 %
Coes' Pattern.....dis 40 %
Taft's.....dis 50 %

St. Louis Metal Market.

(*Corrected Weekly by Messrs. R. Sellew & Co.*)

Tin Plate.

IC, 10x14, Charcoal	$14 00	IX, 20x28, Terne	$52 00
IX, 10x14, "	17 00	IC, continuous,	
IC, 12x12, "	14 50	20 in. x 300 ft.	36 00
IX, 12x12, "	17 50	IX, continuous,	
IC, 14x20, "	15 00	20 in. x 300 ft.	34 00
IX, 14x20, "	18 00	IC, 10x14, best Coke	18 50
IC, 14x20, Terne	13 50	IC, 10x14, good "	13 00
IX, 14x20, " "	15 50	IC, 10x20	20 00
IC, 20x28, "	27 00	IC, 14x20	13 50

Block Tin.

Large Pigs	42c	Bars	44c
Small "	43c		

Sheet Zinc.

Casks	₩ lb 11c	Sheet	₩ lb 11¼c

Solder.

No. 1, Refined, in bars or plate	22c
No. 2, " "	21c
Pig Lead	8c

Sheet Copper.—18 to 100 lbs. Sheets 30x60.....40c
14 to 16 lbs., Sheets 30x60.....42c
10 to 12 lbs., " and 30x72.....45c
6 to 9 lbs., " 48c
Tinned, 14 and 16 oz. 14x48.....38c
Planished, 14 and 16 oz. 14x48.....46c
No. 7, 8 and 9.....48c
Copper Bottoms.....40c

Sheet Iron.—

	Com'n.	sm'th,	Char'l,	Jun.
No. 16 to 20	6¼c	7¼c	8¼c	
No. 22 to 24	6¾c	7¾c	8¾c	
No. 26	6¾c	8c	9c	11½c
No. 27	6¾c	8¼c	9¼c	11½c

Galvanized Iron.—dis 25 %
Iron Rivets......dis 15@ 20 %
Iron Wire......dis 25 %
Coppered Pail Bail Wire......dis 10 %
Copper Rivets and Burs......dis 10 %
Russia Iron.—Nos. 9, 10, 11 and 12, ₩ lb.....22c
No. 1, stained, ₩ lb.....22c
Imitation Russia, ₩ lb.....15c

CHICAGO.

(*Reported by Cragin Bros. & Co., 141, 143, and 145 Lake St.*)

Tin Plate.—

IC, 20x14, Coke	$12 50	IXXX, 14x20, Charcoal	20 50
" 10x14, Charcoal	13 50	IXXX, 14x20, "	22 50
IX, 10x14, "	16 50	IXXXX, 14x20, "	26 50
IC, 12x12, "	14 00	IX, 14x14, "	28 00
IX, 12x12, "	17 00	DC, 100 Plate, "	13 50
IC, 14x20, "	14 50	DX, "	15 50
IX, 14x20, "	17 50	DXX, "	19 50
IC, 14x20, Coke Roofing		DXXX, "	22 50
IC, 10x20 Coke, for Gutters			20 50
IC, 14x20, Charcoal Roofing			13 00
IX, 14x20, "			15 50
IC, 20x28, "			27 00
IX, 20x28, "			32 00
Pig Tin.—		Small, 30 ₩ lb	41c
Large, 60 ₩ lb	40c	Bar Tin	43c
Zinc.—			
In casks 1000 ₩ lbs	11 c	In sheets	11¼c
" 500 "	11¼c	Slab	9c
Copper.—Copper Bottoms			40c
Sheathing Copper			38
Planished Copper, 14x48			46
Size, 14x52, 14x56, 14x60		Planished Copper	48c
Nos. 7 8 9			
Braziers' Sheets, 30x60,—6 to 8 lbs	46 c	15 to 100 lbs	40c
10 and 12 lbs	43c	Ingot Copper	
Solder.—Extra Fine, C.		Bolt "	45c
B. & Co.'s Brand	25c	Ordinary, No.	21 c
Fine, No. 1	23c	Plumbers' Solder	23c
Bolt "	40c	Braz'rs' or Spelt'r Solder	35c
Antimony			20c
Babbit Metal			15c @ 25c.
Galvanized Iron Conductor Pipe			₩ lb 10c

Sheet Iron.—

	Common.	Smooth.	Charcoal.
No. 14 to 24	6¾c	7¾c	8¾c
25 & 26	6¾c	7¾c	9 c
27	6¾c	7¾c	9¾c

Add ¼c ₩ lb for 30 in. wide.

Galvanized Iron.....dis 25 %

No. 13 to 20	15c	No. 27	18c
21 to 24	16c	28	20c
25 & 26	17c		

Russia Iron.—

Perfect, 8, 9 and 10	23c	No. 13	c
" 11 and 12	22c	In Sheets, 1c. higher.	
American Russia.—		B	15c
A	15c	In sheets, 1c higher.	
Lead.—		Lead Pipe, in full coils	10¾c
Pig	8¼c	Lead Pipe, when cut	c
Bar	10c	Sheet Lead	10¼c

DETROIT.

(*Reported by Messrs. Jewett & Root.*)

Tin Plate.—Best Charcoal

IC, 10x14	$12 00
IX, 10x14	14 75
XX, 10x14	17 50
IC, 12x12	12 50
IX, 12x12	15 25
IC, 14x20	15 00
IX, 14x20	18 75
XX, 14x20	18 50
XXX, 14x20	21 25
XXXX, 14x20	24 00
DC, 100 Plate	11 50
DX "	14 25
DXX "	17 00
DXXX "	19 75
DXXXX 100 Plate	22 50
IX, 14x14	25 25
IC, 10x14 W	11 50
IX, 10x14 W	14 25

Roofing Tin.—Best Char.

IC, Terne, 14x20	$11 25
IX, " 14x20	14 00
IC, Terne, 20x28	24 50
IX, " 20x28	29 00

Coke Tin.—

IC, 10x14 Coke	$10 00
IX, 10x14, Coke	12 75
IC, 14x20, "	11 00

Sheet Zinc.—Any width.....10¾c

Copper.—

Sheathing	37½c
Copper Bottoms	39½c

Planished Copper.—

Sheathing, 14x48	46c
Boiler Size, No. 7	48c
" " No. 8	48c
" " No. 9	48c

Pig Tin.—

Large Pigs	38c
Small Pigs	39c
Bars	40c

Solder.—No. 1 ..... 21c
No. 2 ..... 19c
Bright Wire......dis 27½ %

Sheet Iron.—

No. 18 Am. Com	5·8c
No. 24 Am. Com	6·0c

Pat. Am. Russia "A,"

Nos. 24, 25 & 26	14c
Russia No. 9, 10, 11 & 12	21½c

W. D. WOOD'S & CO.'S SHEET IRON.—

Nos. 15 to 20 Smooth	$7 05
" 21 to 24	7 25
" 25 & 26	7 45
" 21 to 24 Char'l	8 75
" 25 & 26 "	8 95

CINCINNATI.

Reported by Sellew & Co., Importers and Jobbers Metals, No. 214, 216 and 218 Main street.

Tin Plate.—I. C. 10x14 Charcoal.....$14·00 @ $15·00
I. C. 10x14 best Coke.....13·00 @ 14·00
I. C. Terne, 14-20.....12·50 @ 13·00
I. C. " 20-28.....26·00 @ 28·00
I. C. Continuous.....28·00
Pig Tin.— Straits.....₩ lb 42c
Bancs.....₩ lb 47c English.....42c @ 45c
Solder.— A J.....₩ lb 25c
S. & Co.....₩ lb 28c Roofing.....24c
Lead.—Pig..₩ lb 7½c @ 8c. Bar.....₩ lb 8c @ 9c
Copper.—
Ingot.....₩ lb 31c @ 33c Brazier, 6 to 9 lb...₩ lb 46c
Planished.....51c @ 53c " 10 to 14 oz..." 43c
Sheathing.....44c @ 46c " 14 to 100 lb.." 40c
Bolt.....46c Copper Bottoms..." 45c
Zinc.—Cast, 500 to 1000 lbs.....₩ lb 11½c
Case, 100 lbs....." 11¾c
Slab....." 8¾c @ 9c
Brass.— Roll, No. 38 to 40...₩ lb 50c
Roll, No. 6 to 30..₩ lb 45c Wire, No. 0 to 20..₩ lb 50c
" 30 to 38. " 65c " 20 to 25..." 60c
Babbit Metal.— Black Lead.....₩ lb 25c
Sellew & Co.....₩ lb 35c Market....." 15c
Antimony.....₩ lb 22c
Bismuth.....₩ lb $6 00
Nickel.....₩ lb $2 50
Sheet Iron.— Am Russia A..₩ lb 14 @ 15c
Russia.....₩ lb 20c @ 22c " B.." 13 @ 14c
Smooth Smooth

	Com. B.	Fin. S.	L. U.	D Re'fd.
15 to 20	6·0c	7·5c		9·0c
2 to 24	6·2c	7·8c		9·2c
25	6·4c	8·0c		9·4c
27	6·6c	8·2c		9·6c

Galvanized Iron.—Full bundles.....dis 20 %

Nos. 18 to 20	15c	No. 27	19c
22 to 24	16c	28	20c
25 to 26	17c		

Bar Steel.—Silver, ₩ lb 21c ; Crescent, 17½c.
Iron Wire.....dis 15 %
Enamelled Ware.....dis 33⅓ %
One Piece Corrugated Elbows.—

Charcoal Iron.		Russia Iron.	
4½ inch	₩ doz $3·75	4½ inch	₩ doz $8·00
5 "	4·25	5 "	10·00
5½ "	5·25	5½ "	13·00
6 "	5·25	6 "	13·00
7 "	6·50	7 "	14·00

Leader Elbows—Flat Crimp Refinned.—

	₩ doz.		₩ doz
2-inch	$2 10	2½-inch	$2 25
3-inch	2 50	3½-inch	3 00
4-inch	3 50	4½-inch	4 00

Sheet Iron Bread Pans.....₩ lb 13c
American Broilers.....₩ doz, $13·50
Tinmen's Machines.....net list
Sad Irons.....₩ lb, 5½c
Brass Kettles.—Ansonia.....48c

London Metal Market.

(*From The Mining Journal.*)

	£.	s.	d.	£.	s.	d.
Copper—₩ ton.						
Best Selected	93	0	0	99	0	0
Tough Cake & Tile	92	0	0	98	0	0
Sheathing and Sheets	99	0	0	103	0	0
Bolts	100	0	0			
Bottoms	100	0	0	103	0	0
Old (Exchange)	85	0	0			
Burra Burra	98	0	0	94	0	0
Wire	₩ lb. 0	1	0¾			
Tubes	" 0	1	0¾	0	1	1
Brass—₩ lb.						
Sheets	0	0	10	0	0	11
Wire	0	0	10¾			
Tubes	0	0	11¾	0	0	11¾
Yellow Metal Sheathing	0	0	9			
Sheets	0	0	8¾			
Tin—₩ ton.						
English Blocks	121	0	0	122	0	0
Ditto Bars	128	0	0	129	0	0
Ditto Refined	130	0	0			
Banca	130	0	0	131	0	0
Straits	127	0	0	128	0	0
* **Tin Plates**—₩ box.						
IC Charcoal	1 qual.	2	0	0	2	3
IX "	1 qual.	2	6	0	2	9
IC "	2 qual.	1	19	0	2	2
IX "	2 qual.	2	3	0	2	6
IC Coke		1	12	0	1	16
IX "		1	15	0	2	0
Canada Plates	₩ ton.	23	0	0	23	0
	at works.	22	0	0	22	0
Spelter—₩ ton.

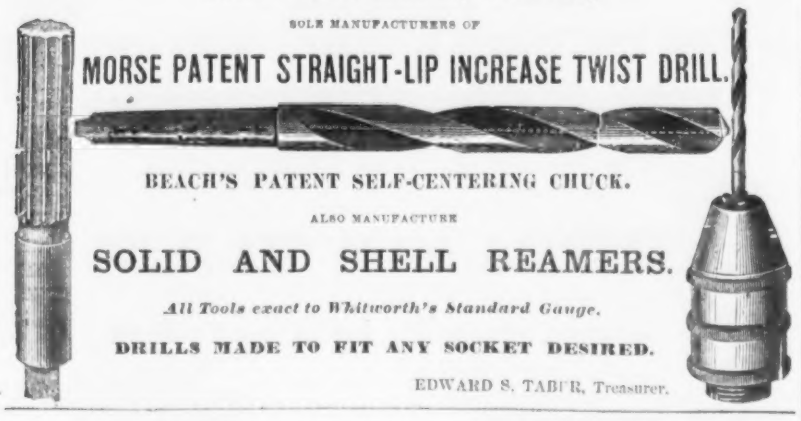
Machinery, &c.

Morse Twist Drill and Machine Company,

New Bedford, Mass.,

SOLE MANUFACTURERS OF

MORSE PATENT STRAIGHT-LIP INCREASE TWIST DRILL.



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All Tools exact to Whitworth's Standard Gauge.

DRILLS MADE TO FIT ANY SOCKET DESIRED.

EDWARD S. TABER, Treasurer.

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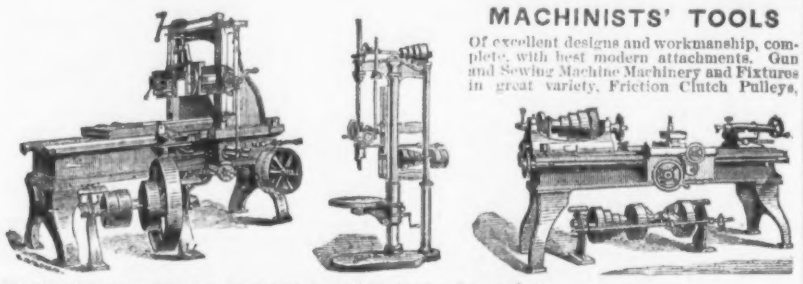
Of excellent designs and workmanship, complete, with best modern attachments. Gun and Sewing Machine Machinery and Fixtures in great variety. Friction Clutch Pulleys,



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THE PRATT & WHITNEY COMPANY, Hartford, Conn.

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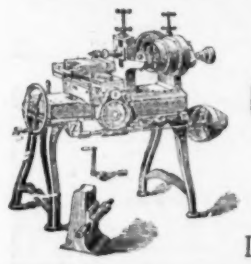

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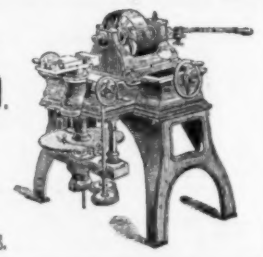
HARTFORD, CONN.

Machinists' Tools,

AND

LINCOLN'S FRICTION CLUTCH PULLEYS.



Fairmount Machine Works,

Office, 2106 Wood St., Philadelphia, Pa.

THOMAS WOOD, *Adjustable Self-Oiling Post Hanger 6 in. from post to center of shaft.*

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POWER LOOMS, with (new) Patent Box Motion. SPOOLING, BEAMING, DYEING and SIZING MACHINES.

BOBBIN WINDING MACHINES—wind direct from hank or skein to shuttle bobbin.

SHAFTING, with Patent Adjustable Self-Oiling Bearings.

PULLEYS, from 4 inch to 10 feet diameter, of most Approved Pattern.

SELF-ACTING WOOL SCOURING MACHINES, (Yewdall's Patent.)

Machines and Foundry Work in all their branches. Send for Price Lists, Pulleys, &c.

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PORTABLE FORGE,

(Patent Applied for.)

Without BELTS or BELLOWS.

It is more Easily Worked, gives a Better Blast, and is the Cheapest forge made, and

☞ It has no Back Draught.

W. P. KELLOGG & Co., Troy, N. Y.

And 118 Chambers St., N. Y.

Also Curry Combs, Boring Machines, nd Cooley's Whip Racks, etc., et

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Machinery, &c.

IMMENSE SAVING OF LABOR.

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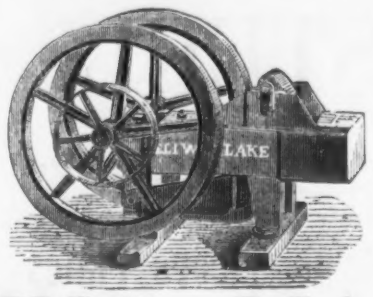

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CRUSHING MACHINE

for reducing to fragments (of any required size) all kinds of

Hard and Brittle Substances, such as

ROCKS, ORES, MINERALS AND DRUGS.

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A. S. GEAR,

Sole Owner and Manufacturer of the GEAR VARIETY MOULDING MACHINE,

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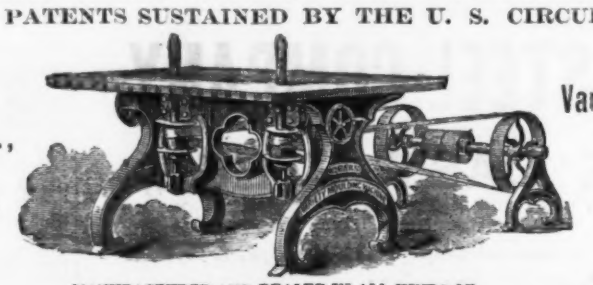

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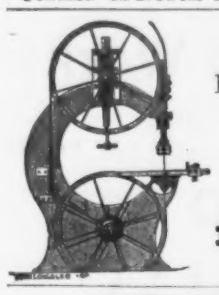

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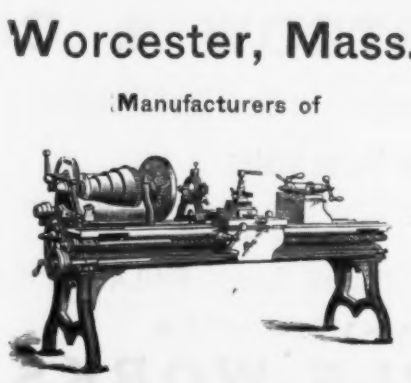

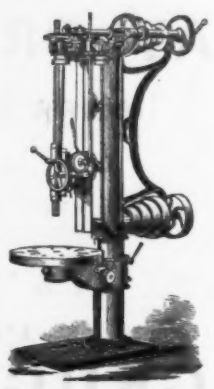

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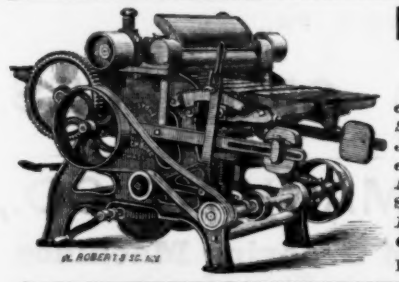

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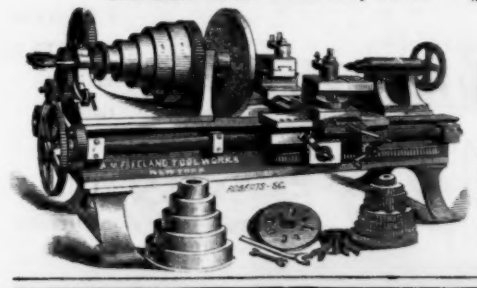

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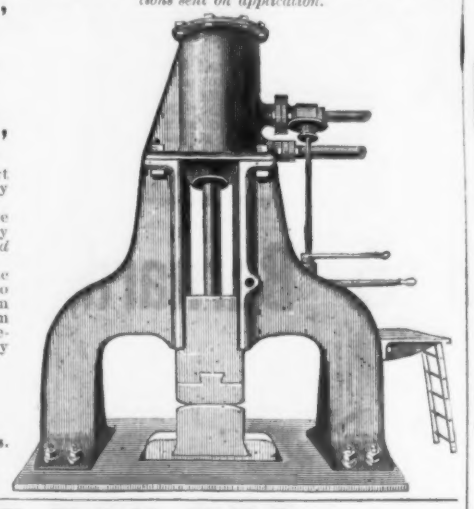

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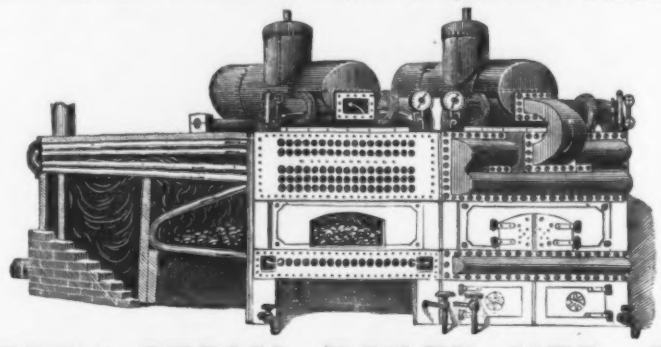

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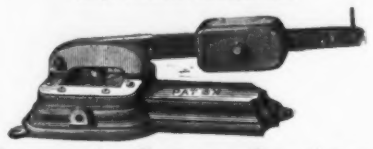

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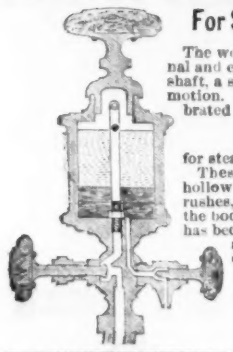

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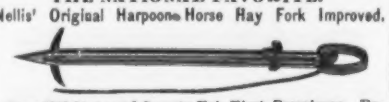

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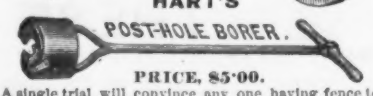

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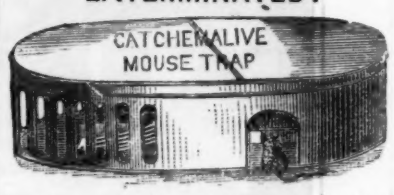

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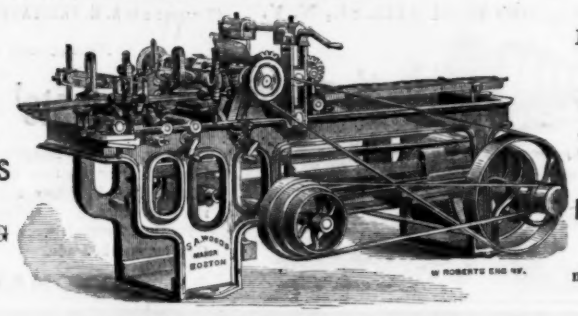

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